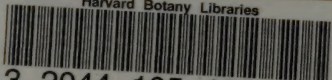


Harvard Botany Libraries



3 2044 105 172 373

THE
JOURNAL
OF THE
ROYAL HORTICULTURAL SOCIETY.

Vol. VIII.

THE FROST REPORT

ON THE
EFFECTS OF THE SEVERE FROSTS ON VEGETATION DURING
THE WINTERS 1879-80 AND 1880-81.

BY

Gray Herbarium
Harvard University

REV GEORGE HENSLOW. M.A., F.L.S., F.G.S.,

Hon

HARVARD UNIVERSITY HERBARIUM.

Sec.

THE GIFT OF

Per
Eng
R-5.1

1887.

THE
JOURNAL
OF THE
ROYAL HORTICULTURAL SOCIETY.

VOL. VIII.

THE FROST REPORT
ON THE
EFFECTS OF THE SEVERE FROSTS ON VEGETATION DURING
THE WINTERS 1879-80 AND 1880-81.

BY
REV. GEORGE HENSLOW, M.A., F.L.S., F.G.S.,
Hon. Sec. to the Scientific Committee of the Royal Horticultural Society, &c., &c.

1887.

H. Weede, Printer, Brompton.

PREFACE.

THE proposal to obtain information upon the injuries to and losses amongst plants from the great cold of the severe winter 1879-80 was first made by Mr. Elwes at a meeting of the Scientific Committee of the Royal Horticultural Society, held on March 9th, 1880; when a Sub-Committee was appointed to collect evidence upon "the effects of the severe frost on vegetation," consisting of Sir J. D. Hooker, Mr. G. F. Wilson, Rev. H. H. Crewe, Dr. M. T. Masters, and Col. F. Clarke, Dr. R. Hogg being Secretary, with power to add to their number. Schedules were issued in April and again in November. The returns of which form the first part of the Reports of this Volume (pp. 1—192).

The winter of 1880-81 having been also exceptionally severe, it was proposed to issue additional schedules; and in order to obtain comparative results, the present writer drew up a list of plants which had been very generally described in the previous schedules. The list being approved by the Committee was issued in the summer of 1881. The reports received constitute the latter portion of this volume.

The extremely low temperatures having formed the particular feature of these winters, I have procured a considerable number of records in addition to those stated by the writers of the Reports; and I endeavoured to verify the latter as far as possible by com-

PREFACE.

paring each temperature with others recorded from the same place or the neighbourhood of it. My main sources of information were Mr. Marriott's papers "On the Frost of December, 1879, and of January, 1881, over the British Isles," as well as Reports from the Meteorological Office, for which I am indebted to the kindness of Mr. R. H. Scott.

In some cases in comparing the temperatures given by the authors of the Reports with others prevailing in the immediate neighbourhood, I found considerable discrepancies, and have therefore inserted a [?] indicating some doubt as to the correctness. If no temperatures were given I have added others from the nearest places, giving the approximate distance in miles (measured from accurate maps of the counties) as well as the altitudes, rainfall, &c. These latter details, as well as the brief summaries of the Meteorological Observations for each County are taken from Symons' "British Rainfall."

I would take this opportunity of calling attention to an article which has lately appeared in the "Annales Agronomiques," tom xii., p. 353 (Aug. 1886), by M. Mouillefert, entitled *La température des arbres et les effets du grand hiver de 1879-1880 à Grignon*, in which the author observes the effect of the frost of 1879-80, after six years upon the trunks of trees. They exhibited three principle degrees of injury with intermediate conditions; viz., some in which the frost having penetrated down to and almost or quite killed the cambium layer, the latter has been renewed by the living medullary rays, the new tissues having united and formed a continuous layer; secondly, where the injury has been more severe, the restoration has only occurred in isolated places; lastly, where all the primitive cambium has been destroyed, as well as all the fundamental tissue which might have been able to recover it, then the tree has no longer vegetated.

PREFACE.

The author then gives a summary of the effects of frost on vegetable tissues and other interesting facts, concluding with an alphabetical list of trees with details concerning their various powers of resisting frost.

I shall be glad to receive any remarks or corrections from the authors of the reports that they may desire to make.

GEORGE HENSLOW.

DRAYTON HOUSE,
EALING.

CONTENTS

	Page.
INTRODUCTION (1) Epitome of the Characters of Severe Winters from 1837 to 1881	i
„ (2) The Distribution of Temperatures	viii
„ (3) The Grouping of Counties into Divisions,	ix
„ (4) The Effect of Soils	xii
„ (5) Subterranean Frost and delayed Evidence of Injuries	xiv
„ (6) Age and its Effects	xvi
INDEX to Counties	xvi
„ to Min. Temperatures	xviii
„ to Plants	xx
„ to Species, Varieties and Individuals, shewing different degrees of Injury and Hardiness	lxi
„ to Miscellaneous Matters	lxiii
ABBREVIATIONS used in the Reports	lxv
ERRATA	lxv
REPORTS, Winter, 1879-80	1
„ Winter, 1880-81	193

INTRODUCTION.

SUMMARY OF THE DIFFERENCES IN CHARACTER OF THE WEATHER PRECEDING AND DURING THE PRINCIPAL SEVERE WINTERS OF THE LAST FIFTY YEARS, WITH THE RELATIVE EFFECTS ON VEGETATION.

1837-38. In consequence of an excessively cold spring, it was not until the autumn of 1837 that vegetation made most of its growth; but from want of sun, the wood could not well ripen; the temp. of Oct. being 2° , and that of Nov., 3° , below the av. In the latter part of Dec. temp. was very high, the mean being 46° , so that young shoots were produced. The first week in Jan. 1838 was unusually warm, but after the 7th the weather increased in severity till the 20th; *e.g.*, temp. at Chiswick, $-4^{\circ}5$; at Beckenham, $-13^{\circ}5$; at Claremont, -12° . *Hence, the greatest injuries were endured by growths being imperfectly ripened.**

1840-41. The severity of this winter was less felt than that of 1837-38; *as the wood of trees and shrubs was well ripened*, and the long period of cold which preceded the severe weather of Jan. 1841 had prevented all tendency to premature growth. Temp. fell to -7° at Bury St. Edmund's; $-4^{\circ}0$ at Stowe, on Jan. 8th; but only to 6° at Chiswick.†

1844-45. This winter was remarkable for its long continuance, from the beginning of Dec. to the middle of March. In 1837-38, the frost was sudden and the ground almost naked; but on this occasion a series of dry winds prepared vegetation for the shock and the ground was thickly covered with snow. *No great amount of injury appears to have been generally recorded*, though the market gardens suffered much around London; the min. temp. at

* *Obs. upon the Effects produced on Plants by Frosts in 1837-8*, by Dr. Lindley. *Trans. Hort. Soc.*, 2nd Ser., Vol. ii., p. 225. See also *On the Effects of the severe Winter of 1837-8 on some Shrubberies and Gardens in Glamorganshire*, by L. D. Dillwyn, Esq., 1839.

† *Gard. Chron.*, 1841, p. 38.

Isleworth being -5° on Feb. 12th. The excessively cold temps., both in 1837-38 and in 1844-45, having been in the S. of England; and the weather having been equally severe on the Continent in the latter winter,—even Orange trees being killed at Marseilles, while the min. temp. was -3° at Turin—it would seem that the South of Eng. lay on the outskirts of a large anticyclonic area over the W. of Europe. It appears to have been very cold at Inverness, but “as the frost came on gradually plants became so hardened as to endure it with impunity.”*

1851-52. Subsequent to a short period of cold weather in Oct. and Nov., the temp. on Nov. 4th being 22° near London, with no injury to plants, there were two months of temp. 2° to 6° above the av., the severest period not returning until April, with N. and E. winds prevailing for three weeks. Previous to Nov. 1851 the weather had been singularly dry with low temps. Hence the tissues of plants were in a state approaching a winter torpor and did not suffer. Much the same conditions prevailed a second time until spring; consequently even tender bushes were quite uninjured. In March, temps. fell to 18° , 17° , 16° and lower, the weather being dry, windy with Easterly winds and the temp. uniformly low. “*The experience of this winter shows the small effect of English cold upon exotic plants, provided they are dry, torpid and well sheltered from sun and warmth.*”†

1852-53. The June of 1852 was cold and wet; July being hot and dry, but Aug. and the remaining months were wet. The mean temp. of Dec. was nearly 47° , and the earth temp. at 1 ft., $3^{\circ}\cdot5$ above the av. Jan. 1853 was nearly 4° above the av., but Feb., with a min. temp. of 16° on the 18th, and the following months, even to Sept., were below the av. *Hence the cold spring following on previously wet and mild seasons caused a considerable amount of injury.*‡

1859-60. Great heat and drought came in the summer of 1859; the ground temp. on Oct. 4th being 62° , and that of the air,

* *Gard. Chron.*, 1845, p. 150. 1885-6. This winter resembled that of 1845 in being prolonged to the middle of March; but there were no very great depressions of temperature as in 1879-80 and 1880-1. For accounts from various parts of the British Isles, the reader is referred to the *Journal of Horticulture*, April 1st, 1886, p. 254, and subsequent issues.

† *Gard. Chron.*, 1852, p. 147.

‡ *Gard. Chron.*, 1853, p. 659.

80°. Much rain followed from Aug. 20th; 5·7 ins. falling in 40 days. *The consequence was that "it had the effect of a smart bottom heat" at the end of the year, stimulating vegetation most unnaturally.* On Oct. 21st the temp. suddenly fell to 23°, and on the 23rd to 17°, while the ground lost 10° in 5 days. *This caused immense damage, especially to succulent plants.**

1860-61. The year 1860 was almost unparalleled for its cold and wet; Dec. being the coldest month since 1789. *The preceding sunless and wet seasons prevented the ripening of wood and seeds.* The min. temp., Dec. 25th, -15° at Chatteris and Cheadle; of 180 obs., 87 were below 0°; 8 at 0°; 62 below 10°, and 23 above 10°. "There was an almost entire absence of any piercing continuous wind which inflicts such injury on plants."†

1878-79. The mean temp. of 1878 was above the av. of 60 years for 9 months (Blackheath). Hence conditions were exactly the reverse of those of 1860. *Vegetation was retarded in the spring, while the root development was not stimulated in the aut., hence the wood was well matured, and the whole energies of plant growth brought so nearly to a dormant state that they were in the best condition for resisting severe cold,* which continued through Jan. The mean temp. of the 3 winter months was 5° below the av. at Bath; and that of the 3 spring months 2°·5 below the av. spring mean. A marked feature of the winter was that the depression of the max. temps. was greater, or more below the av. than the depression of the min. temps. This explains, in part, the long continuance of cold, without any such extremely low temps. as have occurred in previous long winters.‡

1879-80. The temp. of every month of the whole of 1879 was below the av.; such not having been the case since 1776. There was much rain and little sun. The total fall at Blackheath was 31·3 ins. Nov. was an exceedingly cold month with scarcely any rain till after the 18th. It was not, however, a dry month, owing to mists. Dec. was remarkably cold, the temp. being lower than

* *Gard. Chron.*, 1860, pp. 170, 335 and 585.

† *Gard. Chron.*, 1861, pp. 23, 73, 169. See *Report on the unusual Intensity of the Frost of Dec. 1860 and Jan. 1861 &c.*, by Duncan Forbes, Culloden.

‡ *Gard. Chron.*, 1879, I., pp. 112 and 143; See, *Winter of 1878-9, in Bath, and the Seasons following*, by Rev. L. Blomefield.

in any Dec. in this century. It was characterised by dense and very continuous fogs with a high barometer. *The unripened condition of vegetation felt the severity extremely.*

The winter of 1879-80 commenced in the latter part of Nov., min. temp. ranging from 20° to 24° . Scarcely any rain fell after the 18th. The most severe periods, however, were from 1st to 7th of Dec., the 11th and 19th. Less intense frosts prevailed from 21st to 26th, and again at the end of Jan. 1880.

The barometric indications of the coming severity first appeared on Nov. 30th in a well marked oval depression over the N. sea ($29\cdot7$ ins.) ; while anticyclonic conditions prevailed in Norway and on the West of Great Britain. Temps. began to be lowered generally and snow fell over Scotland and the E. side of England on Dec. 18th. The min. temps. on this day were at York, 23° ; Nottingham, 22° ; Cambridge, 23° ; and London, 22° . On the 2nd the cyclone dispersed, giving rise to a small subsidiary one, the centre of which was at Shields, where the min. temp. was 17° ; though the centre of the isotherm of 10° was near Nottingham, the min. temp. at that place being 4° ; that for all England, being at Coston, *viz.*, $-4^{\circ}\cdot5$. On the 3rd, pressure and temp. were very complicated. Cyclones occurred over the Baltic, the coast of Holland and the Bay of Biscay ; while a centre of high pressure occurred in France, and a second stood over Scandinavia. There were three centres of very low temps. in Great Britain, *viz.*, Kelso, 3° ; Braemar, $-0^{\circ}\cdot8$; South of Edinburgh, 0° ; and also between York and Durham. On Dec. 4th temp. rose in S.W., with a well defined cyclone, and fell in the N. under a large anticyclonic area ; the isotherm of 20° , now extending over the greater part of the whole of the British Isles, running nearly parallel to the coast line throughout. Min. temps. for the winter occurred, *e.g.* at Blackadder, -23° ; Corbridge-on-Tyne, -5° ; Leaton, $-11^{\circ}\cdot9$; Aberystwith, 4° , &c. On the 5th the min. temps. of the winter occurred chiefly in Ireland and the S.W. extremity of England. The isotherm of 30° (which on Dec. 4th excluded all England excepting the S.W. corner) now ran vertically from Plymouth to Aberdeen. The min. temps. of St. Austell being $18^{\circ}\cdot2$; Southbourne, $16^{\circ}\cdot8$; Ventnor, 22° ; and in Ireland, at Colebrooke Park, 9° . On the 6th, temp. rose several degrees on the W. and S.W. ; the isotherm of 30° now extended Westwards to W. coast of Scotland. The min. temps. of the winter

occurring only at Drumlanreg, 1° ; and Dumfries, 8° ; in Scotland; and at York, 0° ; Northampton, $5^{\circ}2$; and Trent College, -3° . The max. temp., however, was much below 12° at many places, preparatory to the great severity of Dec. 7th. This proved to be the intensest period especially for counties bordering the N.E. and E. coast, as well as the counties adjacent to these including Middlesex and Hampshire. A single isotherm of 0° extended from near Manchester to Essex; while that of 10° reached from Edinburgh to N. Hants, and from the E. coast to Birmingham; that for 20° again occupying the greater part of central Ireland. The following temperatures will show this severity:—Appleby, $-4^{\circ}7$; Worksop, $-5^{\circ}8$; Buxton, $-3^{\circ}8$; Ketton (Rutland), -10° ; Audley End, $-5^{\circ}5$; Much Haddam, -3° ; Enfield, $7^{\circ}9$; Swarraton, 9° . On the 8th, low temps. still occurred, the min. temps. for the winter being recorded that day, at Nottingham, -2° ; Loughborough (2nd and 8th), $1^{\circ}5$; Yarmouth (17th and 18th), 15° ; Cambridge (7th and 8th), 0° ; Watford (7th and 8th), $7^{\circ}6$; Oxford (7th and 8th), 12° . Milder weather followed until the 16th, when temp. once more fell in consequence of a large anticyclone being over Germany, but extending to Aberdeen, the isotherm of 30° passing up the Channel. This, on the 17th, crossed over the S.E. of England and extended as far N. as Yorkshire; consequently the min. temps. of the winter now occurred along the S.E. coast; *e.g.*, Walmer, 15° ; Folkestone, $11^{\circ}8$; Eastbourne, 19° ; Hurst Castle, 22° . Low temps. prevailed at the end of Dec. and again at the end of Jan., but in no case did the min. temp. of the winter occur at this period at any place in the British Isles.

1880-81. Until July 1880 there was no excessive rainfall; but in that month it was above the av. in every meteorological station. An excess occurred locally in Sept. and Oct. In Nov. and Dec. it was of average amount. The severe weather did not begin till Jan. 6th, and then lasted till the 26th. The injuries to vegetation were probably due to the frost being so prolonged, while considerable injury followed in the spring by the intensely cold E. winds acting upon the already weakened vegetation. The winter was marked by three excessively cold periods; *viz.*, Jan. 7th to 9th, 12th to 18th, 20th to 26th. The min. temps. of the winter at all places recorded in the British Isles occurred during the two latter. From the 6th to 10th a well-marked anticyclone stood over the British Isles, with

cold dry weather and Easterly winds. On the 11th a depression was formed in the N.E. of Scotland, which moved South-Eastwards on the 12th. It then stood with its centre about York, causing snow in N.E. of England. On the 13th it had passed to the coast of Holland while an anticyclone formed in the W. North winds consequently blew over the whole of the British Isles. Min. temps. for the winter now began to occur in N. Scotland; *e.g.*, Sumburgh Head and Scourie, 19° . On this day the isotherm of 20° ran nearly parallel with and close to the coast lines of the British Isles, avoiding the N.E. of Scotland alone. There were nine distinct areas with min. temps. of 10° , two being in Ireland. On the 14th, those in England became merged into three large areas, one extending from N. Scotland to Manchester; a second from near York to Cambridge; and a third, of triangular form, from Liverpool to Milford Haven and Oxford; other small circles occurred N. of Plymouth, as well as two in Ireland, around Belfast and Waterford, respectively. Min. temps. for the winter, as recorded from Scotland only; *e.g.*, Culloiden, 4° ; Nairn, 5° ; Stronvar, 4° . From the 15 to 17th these districts became welded together, and now included, on 15th, six smaller areas bounded by isotherms of 0° . Hence several places from Edinburgh to the Midland counties had their min. temps. for the winter; *e.g.*, on 16th, at N.W. of England, especially Scaleby, -7° ; Alston, -9° ; St. Michaels-on-Wyre, $-7^{\circ}5$; Chester, $0^{\circ}8$; Corwen, -8° ; while on 17th temp. sank to extreme depths, *e.g.* at Kelso, -16° ; Stobo, -15° ; and Melrose, -10° . Min. temps. for the winter also occurred near London; *e.g.*, Regent's Park, $9^{\circ}8$; Kew, $4^{\circ}7$. These temps. were accompanied by somewhat complicated barometrical conditions. An anticyclone stretching from N.W. to S.E. (with a pressure of upwards of 29.8 ins.) lay over England on the 14th; but a depression stood over S. Norway (29.4 ins.) causing heavy snow in N. Scotland. Anticyclonic areas prevailed over N.W. France and England as far North as Yorkshire; and also over Ireland (both with pressure of 29.8 ins.). The former caused the min. temp. for the winter about London. The pressure on the West gave way, on the 17th, indicating the approach of a deep depression, which brought on the fearful storm on the 18th. This day will ever be remembered for the terrific snow storm and strong Easterly gales over the greater part of England, the N. alone being free from it; as the centre of the cyclone stood over the North of the

Channel. Temperatures were not so low as on the preceding days ; falling more decidedly over the N. of Scotland, Aconochie recording -4° as the min. temp. of the winter on that day. At Nairn also, the temp. was 5° , and at Stoko, -15° , for the second time. On the 19th the cyclone passed slowly Eastwards, and temps. generally rose. The isotherm of 20° now corresponded with the coast line of Scotland and central Ireland. On the 20th the same isotherm tallied with the entire coast line of Great Britain and Ireland ; while at several isolated spots the temp. fell to 0° and lower. The region of greatest cold having travelled Southwards ; thus at Cardigan, the min. temp. for the winter was -10° ; at Ketton, -4° ; Cheltenham, $-3^{\circ}3$; and at a few places on the S. coast ; *e.g.*, Plymouth, 17° ; Babbacombe, $15^{\circ}3$. On the 21st, the several areas, bounded by isotherms of 10° , again became welded together, indicating increased cold ; for two anticyclones (isobar of 29.9 ins.) one to N. of Scotland, the other, W. of Ireland, had extended over England from the N. and W. Pressure now increased to 30.1 ins. It increased still more on the 22nd, when the isobar of 30.2 ins., included the whole of the Br. Isles, while that of 30.4 was concentrated over Ireland. On the 24th, excepting N. Scotland and S.W. Ireland, the oval shaped isobar of 30.2 ins. included the whole of the Br. Isles, France and Germany. Great cold and dense fogs prevailed on S.E. counties. The isotherm of 20° nearly corresponded with this isobar. Several detached isotherms of 10° occurred at inland places with that of 0° in Scotland. Skegness recorded min. temp. for the winter, 7° ; and at the S. of England, Southbourne, $12^{\circ}1$; Woolston, $8^{\circ}4$. The 24th was preparatory to the last severe period of the 25th and 26th, in which the four isolated areas of 10° in the Midland counties of England became united. Min. temps. for the winter occurring on the 26th, as follows:—Haydon Bridge, -6° ; Sorrel Sykes, -9° ; Scarborough, $7^{\circ}7$; Leeds, 12° ; Cossey, 1° ; Llandudno, $16^{\circ}5$; Churchstoke, -1° ; St. David's, $16^{\circ}1$; Ilfracombe, 20° ; and Altarnon, 3° . The isobar of 30.2 ins. of the three previous days now fell to 30.0 ins., while dense fogs still prevailing indicating the approaching break up of the winter, which took place on the 27th ; on which day the anticyclone moved off to the continent and yielded its place to a succession of cyclones from the W., the bar. rapidly falling from 29.2 ins. on 27th to 28.9 on 29th, with corresponding increase of temperatures.

ON THE DISTRIBUTION OF TEMPERATURES. A study of the isotherms of English winters and the distribution of corresponding barometrical pressures, show that low temps. are due to radiation. The isotherms of 30° and 20° usually run very nearly parallel to the coast, while those of lower temps. are generally surrounding isolated "patches" or "spots" which are included within the former. A comparison of such positions with the physical features of the land clearly shows how the form of these isolated areas correspond with the more elevated tracts. Thus a "spot" appeared on Dec. 3rd, 4th and 11th, 1879, immediately South of Edinburgh with temps., 0° , -10° , and 10° , respectively, over the high land between Lammermuir and Cheviot hills. It occurred again in the winter of 1880-81. As an example of a "patch" may be mentioned one on Jan. 14th, 1881, extending from Chester to Milford Haven and to Berks. This includes the high land of Wales, bounded on the East by the Clen and Lickey Hills, and corresponds with the Cotswold hills and the table land which extends Eastwards.

The close correspondence of higher isotherms (20° and 30°) with the coast line points to the ameliorating influence of the proximity to the sea, as vapour tends to arrest radiant heat; whereas it more readily escapes from land, where the temp. of the air is correspondingly lowered by radiation. Thus, the more inland and elevated regions are, other things being equal, more subject to low temps. than maritime.

When, however, we investigate the causes of *locally* low temps., in contradistinction to those of more extended areas, we find the converse to hold true; that is to say, the temp. in a valley will be often many degrees colder than that on the adjacent land, say from 100 to 200 ft. higher. Gilbert White was the first person who noticed this fact in the severe winter of 1784, when his thermometer fell to -1° on Dec. 10th; whereas at Newton at an elevation of "two hundred feet or more," it only fell to 17° ; and as a consequence he says, "All my Laurustines, Bays, Ilexes, Arbutuses, Cypresses, and even my Portugal Laurels, and what occasions more regret, my fine sloping Laurel hedge were scorched up; while at Newton the same trees have not lost a leaf." Numerous instances are recorded in the following reports, and M. Duchartre records similar facts in France.*

* *Journal de la Soc. Nat. et cent. d'Horticulture de Fr.*, 3 Ser. Tom. ii. (Nov. 1880), p. 678; Tom. iii. F  v. 1881. p. 89.

It is not very manifest at first sight why the temperature should be lower in valleys; but the best interpretation of this fact seems to be that the air is in a more rapid circulation over the exposed and more elevated ground; and that, as it cools by radiation, it becomes heavier and glides down the sloping ground and is immediately replaced by air of a warmer temperature. Hence the thermometer does not indicate so low a temp. as in the valley below, which not only receives the heavier and colder air from above, but, being less subject to currents, radiation can proceed undisturbed, and its effects accumulate, till the difference between the temp. in the valley and that on the adjacent higher ground may be very considerable. Moreover, as moisture prevails in lower ground, as long as evaporation goes on, there must be an additional tendency to keep the air in the valleys constantly at a lower temp. than in the higher ground. When, then, the temp. falls below 32° , the preceding causes are probably quite sufficient to account for the excess of cold in the valleys.*

ON GROUPING THE COUNTIES INTO DIVISIONS. In the Reports I have followed the Divisions of Mr. Symons in his *British Rain-fall*; but in order to ascertain the relative effects of the frost over groups of counties, I have found it desirable to arrange them rather differently and more in correspondence with the prevailing isotherms, which, as already stated, are regulated by the physical features of the land. The counties only partially agree with these latter, hence the best possible arrangement cannot give more than approximate values.† Again, in estimating the amount of losses

* As an illustration, Mr. Dines in a paper "*On the Temperatures of Hill and Valley*," in the JI. of the Met. Soc., 1872, pp. 100—102, compares Denbies near Dorking, alt., 610 ft., with Cobham, 6 ms. dist. and 65 ft. above the sea. On the morning of Dec. 31st, 1870, the min. temp. at Cobham was $1^{\circ} \cdot 2$, but at Denbies, 14° ; and out of 43 occasions, when the temp. was below 25° at both places, the av. upon the hill was $23^{\circ} \cdot 3$ against $18^{\circ} \cdot 9$ in the valley. See corroborative remarks by Mr. A. Buchan, in *Trans. Bot. Edin.* Vol. xii. pp. 51, 52.

Regarding this fact from a practical point of view, besides the obvious conclusion of not planting the more tender shrubs in low-lying localities, it must be borne in mind that radiant heat accumulates in valleys; consequently vegetation is stimulated by the extra heat and moisture, and is therefore in a worse condition for withstanding an excess of cold, than on higher and drier ground.

† Thus Nottinghamshire, though on the Eastern plain, feels the effect of the adjacent high land of Derbyshire; while Lincolnshire should be divided into a warmer eastern, and a colder western half; &c.

and injuries in the various groups of counties, the reports themselves are only roughly approximate; for the numbers of returns from the different counties are very unequal, so that the averages cannot but be approximate also; and in addition, there are local differences in the character and position of the gardens. Lastly, the number of plants included in the reports themselves depends upon the cultivator; some being excessively brief, others of great length. These considerations, being borne in mind, the following are the principal results as far as the reports enable me to ascertain them.

WINTER, 1879-80.

ENGLAND.—1. E. COAST—This includes Northumberland, Durham, Yorks (N. and E. Ridings), Lincoln, Norfolk, Suffolk, Essex, Herts., Middlesex, Surrey, Kent and Sussex. The total number of plants killed and injured in the winter 1879-80 was 1168 at 65 places; or nearly 18 at each place.

2. S. COAST—This includes Sussex,* Hants, Isle of Wight, Dorset, Wilts, Somerset, Devon and Cornwall. Total killed and injured, 602 at 34 places; or nearly 18 at each place.

3. S. TABLE-LAND—This includes Berks., Bucks., Gloucestershire and Oxfordshire. Total killed and injured, 860 at 13 places; or 66 at each place.†

4. GREAT CENTRAL PLAIN—This includes Beds., Cambs., Hunts., Leicester, Northampton, Rutland, Stafford and Warwickshire. Total killed and injured, 731 at 26 places; or nearly 28 at each place.

5. VALLEY OF THE SEVERN—This includes Monmouth, Hereford, Shropshire and Worcestershire. Total number killed and injured, 84 at 8 places; or 10·5 at each place.

6. CENTRAL HIGH-LAND—This includes Yorks. (W. Riding), Derby and Nottingham. Total number killed and injured, 389 at 14 places; or nearly 28 at each place.

7. N. W. COAST—This includes Cumberland, Westmoreland, Lancashire and Cheshire. Total killed and injured, 257 at 14 places; or about 18 at each place.

* SUSSEX is included in both E. and S. coasts, in accordance with the prevailing distributions of isotherms.

† This is perhaps too high, as the number of plants grown at two places was exceptionally great.

ANGLESEA and WALES—Total killed and injured, 224 at 11 places ; or about 20 at each place.

SCOTLAND.—1. S. E. HIGHLANDS—This includes Berwick, Dumfries, Edinburgh, Haddington, Peebles, Roxburgh and Selkirk. Total killed and injured, 503 at 18 places ; or 28 at each place.

2. W. COAST—This includes Kirkcudbright, Ayr, Lanark, Argyle, Bute and Dumbarton. Total killed and injured, 97 at 11 places ; or nearly 9 at each place.

3. CENTRAL HIGHLANDS — These include Aberdeen, Inverness, Perth, Ross and Sterling. Total killed and injured, 139 at 10 places ; or 14 at each place.

4. E. COAST—This includes Caithness, Sutherland, Ross, Inverness, Nairn, Elgin, Banff, Aberdeen, Kincardine, Forfar and Fife. Total killed and injured, 225 at 25 places ; or 9 at each place.

IRELAND.—1. THE ENTIRE COAST—This includes Antrim, Clare, Cork, Donegal, Dublin, Kildare, Louth, Wexford and Wicklow. Total number killed and injured, 251 at 14 places ; or 18 at each place.

2. INLAND COUNTIES—These consist of Armagh, Kilkenny, Meath, Monaghan, Sligo and Tipperary. Total number killed and injured 292 at 9 places ; or 32·5 at each place.

WINTER, 1880-81.

ENGLAND.—1. E. COAST — Total number of plants killed and injured in the winter, 1880-81, was 1258 at 39 places ; or about 32 at each place.

2. S. COAST—Do., 851 at 22 places, or nearly 39 at each place.

3. S. TABLE-LAND—Do., 554 at 16 places, or 35 at each place.

4. THE GREAT CENTRAL PLAIN—Do., 667 at 15 places, or about 44·5 at each place.

5. VALLEY OF THE SEVERN—Do., 247 at 6 places, or 41 at each place.

6. CENTRAL HIGH-LAND—Do., 328 at 6 places, or nearly 55 at each place.

7. N. W. COAST—648 at 15 places, or about 43 at each place.

ANGLESEA and WALES—Do., 546 at 11 places, or nearly 50 at each place.

SCOTLAND.—1. S. E. HIGHLANDS—Do., 423 at 8 places, or nearly 53 at each place.

2. W. COAST—Do., 325 at 6 places, or 54 at each place.

3. CENTRAL HIGHLANDS—Do., 292 at 9 places, or 32·5 at each place.

4. E. COAST—Do., 429 at 9 places, or nearly 48 at each place.

IRELAND.—1. ENTIRE COAST—Do., 198 at 33 places, or 6 at each place.

2. INLAND COUNTIES—Do., 121 at 3 places, or about 40 at each place.

The preceding results show, as might have been anticipated from the arrangement of the isotherms, that the proximity of the sea has a moderating influence, while inland counties and higher regions of the land exhibit a proportionally greater amount of injuries to vegetation. In these general results, the minor differences amongst the injuries to plants in consequence of their growing in valleys or on relatively higher ground are lost sight of.

ON THE EFFECT OF SOILS. The general advantage of a light soil with a gravelly subsoil, in comparison with a heavy retentive one for certain kinds of trees and shrubs is very evident; unless artificial drainage can overcome the natural defects of the latter. Sir J. D. Hooker in an article upon the losses and injuries sustained at Kew after the severe winter of 1860-61, remarks as follows:—“Owing to the nature of the soil and climate, there are whole groups of plants that do not at all succeed; as for instance the majority of Spruce Firs, Larches, Ash, Elders, Clematis, many Abies, Silver Firs (*Webbiana*, *pectinata*, &c.) very many kinds of Roses and such plants generally as thrive on clay or other retentive soils or that require a cool or rocky subsoil . . . Nevertheless, when it is considered that we have bad or indifferent specimens of all such plants as do not thrive it is evident [from the comparative smallness of the list appended] that the locality is a most favourable one for a botanical collection in the most essential respect of climate, that could be well selected. Within a few hundred yards, on the opposite, clayey side of the Thames, the destruction has been ten times greater than at Kew; and whole groups of plants, such as *Araucarias*, *Deodars*, *Hollies*, common *Laurels*, *Rhododendrons*, &c., which have been materially injured or killed in

the neighbourhood of London, or elsewhere, are absolutely unscathed at Kew."*

Similarly Mr. A. H. Kent writing from Blechingley, Surrey, on Feb. 23rd, 1861, describes his locality as having "a soil, chiefly of light dry sand with very little clay and loam. All kinds of Coniferæ thrive well . . . as the soil prevents an accumulation of moisture at the roots, notwithstanding the great rains of the past year (1860). The oft repeated caution to have ground on which it is intended to plant Coniferæ and Evergreens well drained is a great fact, and not to be disregarded with impunity."† As instances of slight injuries following the severe winter of 1879-80, the reader is referred to the Reports from Beds., p. 25, and Bucks., p. 27.

Twenty years ago Dr. Lindley drew attention to the importance of drainage, if the soil was not naturally of a porous character, both surface and underground—"The means of surface drainage should be at command when required; but by deepening the soil where it is too thin and rendering it permeable to water with deep under drainage to prevent stagnation, most of the summer rain that falls can find its way through the soil, rendering it comparatively warm. But where under drainage is neglected, the accumulated moisture stagnates on the already saturated soil, cold in consequence of the winter rains or melted snow having never been drawn off; that moisture from its coldness is heavier than the summer rains; the latter may run off the surface, and thus their warming effect on the soil is lost, but they cannot displace the colder and heavier water, which consequently retains possession of the soil for the greater part of the growing season, and in that case the crops cannot thrive as they otherwise would, and are, besides, rendered late, so that in bad seasons they are in danger of being lost."‡

As an instance of much injury accruing to trees on tenacious clay, the reader is referred to the Report from Bucks, No. 4, p. 28, while the contrary result followed from good drainage at Brickhill Manor, Bucks., Rep. No. 2, p. 27, and at Impney Pk., Worcester, Rep. No. 2, p. 73; while the Rep. from Headington Hill Hall, Oxford, No. 3, p. 38, bears out Mr. Kent's remarks on Coniferæ

* *Gard Chron.* 1861, p. 830.

† *Gard. Chron.* 1861, p. 16.

‡ *Gard. Chron.* 1861, p. 4.

thriving on a light and well drained soil. Lastly, M. Duchartre notices the same facts in France, M. Moreau having recorded that trees and shrubs as well as fruit-trees remaining intact on dry sandy ground, while others suffered severely, perishing even to the ground in humid places. For particular remarks the reader is referred to INDEX to Miscellaneous Matters, *s. v.* Soil.

SUBTERRANEAN FROST AND DELAYED EVIDENCE OF INJURIES. A cause of serious injury which has been too little investigated is the inequality of resistance to frost which the subterranean parts of plants possess ; not only, as M. Duchartre observes for different species or varieties, but also for different individuals of even the same species or variety. Sometimes the roots have perished, at other times they and the subterranean portion of the stem have alone survived, while the aerial parts succumbed.

In our Reports, numerous cases are recorded of plants being "killed to the ground." This is generally understood to mean that the roots and rootstock have survived, as in many cases they are described as shooting forth again on the return of warm weather. On the other hand cases are recorded of trees apparently healthy in March, April or May which have then more or less suddenly collapsed. This seems to show that the whole tree received so severe a shock that it was only existing for a time at the expense of the living tissues of the aerial portion ; and when these were exhausted the plant perished.

An interesting case of the death of Peach trees in May, 1860, is recorded in the *Gardeners' Chronicle* (p. 481) for that year, upon which the editor remarks (p. 501)—"The trees in question, &c., grew on a S.W. wall ; they must therefore, in so warm a place, have had their sap rising after the ground, heated to 65° , had been soaked with rain. Under such circumstances a sudden fall of temperature to 17° or 15° below freezing could not fail to give a shock to the constitution of so tender a tree as the Peach, from which it would never recover." The writer adds the following case—"Two young and vigorous Peach trees, of the double Chinese kinds, appeared to have escaped the injury of October, their branches were plump and healthy, except at the points. They received a winter pruning and pushed as usual in the spring ; but shortly afterwards the shoots began to droop and wither ; one is now dead to the ground and the other following it. In this case, as it probably was in others, the sap vessels of the stem were killed ; and it was only when they were

called upon to feed the young leaves that their powerless condition was made manifest."

M. Duchartre, in his report of the winter of 1879-80, (p. 102) quotes M. Voiron as testifying to this "slow mortality;" who writing in the month of May, says that 15 trees which had apparently only suffered slightly (*compromis*) in April, were then dead; and he adds that a succession of deaths proceeded till the Autumn. M. Alf. Cottin, of Sannois, corroborates the remark and states that it is not rare to see Apple trees dying with their fruit formed or even in maturity.

It is well known to foresters and all planters that forest trees, such as the Ash, frequently do not conspicuously show the full effect of injuries received till, it may be, several years afterwards.

Again, with reference to Ground Temperatures, Dr. Lindley remarks,* after the winter of 1837-38—"Nothing seems more generally to have excited surprise, than that so many plants, apparently killed, spring up again from the roots. Hence it has been generally said, that many species which would have survived, if undisturbed, were thrown away. . . . In all cases, the roots of trees suffer from frost less than the stems, partly perhaps because the vitality of a root is greater than that of a stem, as Mr. Knight long since shewed: but more especially because they are so much less exposed to cold. That the earth, being a bad conductor of heat, should remain in winter at a higher temperature than the superincumbent atmosphere will excite no surprise; but probably few persons are aware, to how small a degree the temperature of the earth is lowered in this country, during even long continued and severe frost. . . . Thus, two thermometers have been buried in the earth, one at the depth of 1 foot, the other at the depth of 2 ft., and their indications have been noted daily. The ground was never frozen to the depth of a foot in the Society's garden, even while the temperature of the surface was as low as $-4^{\circ}5$, and it did not fall to within 5° of freezing at the depth of 2 feet during the same period."

A few instances of ground temperatures are mentioned in the following reports, but a large proportion of plants are recorded as killed to the ground; while many of these are described as shooting

* Report of Frost of Winter, 1837-38. *Trans. Hort. Soc. 2nd Ser. Vol. ii.*

from the roots again ; as examples, the reader is referred to p. 16, an *Arbutus* stood the winter but began to flag in April when three-fourths of the tree died ; p. 37, Lombardy Poplars shewed late evidence of injury ; p. 87, Portugal Laurels shewed no visible sign of injury till the foliage fell in spring ; p. 124, severe injuries only detected by the effects of E. winds in spring. (*See* also pp. 26, 46, 47, 90.)

AGE. The age of plants as well as of parts of plants is often an important factor in the power of resistance to frost. In some cases the younger trees survived,* while the adult or aged trees of the same kinds perished. M. Duchartre records from certain parts of France that trees from 15 years of age and upwards perished, but chiefly survived below that number ; elsewhere trees below 10 years of age appeared to be better able to resist frost ; *e.g.* amongst Plums and Cider Apples. Trees planted but one or two years only escaped. On the other hand M. Alf. Cottin observed that in the parts of the plantations of Mont Trouillet near Paris, situated on low ground, trees of 0, 30, 50 and even 100 years old succumbed ; while the very few that survived were young and newly planted trees.

In the following reports young and old appear to have suffered pretty equally. In some cases the younger, in others, the older of the same species were injured ; as will be seen by referring to the *Index of Age*.

INDEX TO COUNTIES.

ENGLAND and WALES. Anglesea, 115, 117. Bedfordsh., 23, 25. Berks., 3, 5, 195, 197. Bucks., 23, 27, 218, 219. Cambs., 23, 29, 218, 221. Cardigansh., 116, 122, 301. Carmarthen, 116, 121, 297, 301. Carnarvon, 115, 118, 298. Cheshire, 91, 92, 276, 277. Cornwall,† 49, 50, 235, 237. Cumberland, 104, 105, 288, 289. Denbighsh., 115, 119, 297, 298. Derby, 75, 76, 264, 265. Devon,

* This also occurred near Ware in 1861. *Gard. Chron.* 1861, p. 95.

† See *Jl. of Hort.*, 1880, June 17th.

49, 52, 235, 239. Dorset,† 49, 54, 236, 240. Durham, 104, 109, 288, 292. Essex, 40, 41, 230, 231. Flint., 115, 297. Glamorgan,‡ 116, 122, 392. Gloucester, 61, 62, 247, 248. Hants., 3, 6, 195, 198. Hereford, 61; 68, 247, 257. Herts., 24, 31, 218, 223. Hunts., 24, 34, 218, 226. Isle of Wight, 3, 9, 195, 201. Kent,§ 4, 11, 195, 202. Lancashire,¶ 91, 94, 276, 280. Leicestersh., 75, 81, 264, 268. Lincolnsh., 75, 85, 264, 273. Merionethsh., 115, 120, 300. Middlesex, 1, 2, 193, 194. Montgomery, 116, 120, 297, 300. Monmouthsh., 116, 298, 305. Norfolk, 40, 45, 230, 234. Northamptonsh., 24, 36, 218, 227. Northumberland, 105, 112, 288, 293. Nottinghamsh., 76, 88. Oxfordsh., 24, 38, 219. Pembroke-sh., 116, 124, 297, 303. Rutland, 76, 90, 265, 274. Shropsh., 61, 70, 247, 260. Somersetsh., 49, 58, 236, 243. Staffordsh., 61, 71, 247. Suffolk, 40, 47, 230, 233. Surrey,** 4, 15, 22,* 196, 205. Sussex, 4, 19, 196, 212. Warwicksh., 62, 71, 248, 261. Westmorland, 105, 113, 288, 295. Wilts, 50, 60, 236, 244. Worcestersh., 62, 73. Yorksh., E. Riding, 96, 99, 282, 285; N. Riding,†† 96, 102, 282, 287; W. Riding, 96, 97, 282, 283.

SCOTLAND—Aberdeen, 161, 162, 325. Argyle, 147, 148, 317, 318. Ayr, 144, 314. Banff, 161, 164, 325, 326. Berwick, 132, 133, 309. Bute, 147, 149. Caithness, 172. Dumbarton, 147, 149, 317, 319. Dumfriessh., 126, 127, 306. Edinburgh, 132, 135, 309, 311. Elgin, 161, 165, 325, 326. Fife, 153, 154, 320. Forfar, 153, 155, 320, 322. Haddingtonsh., 132, 140, 309, 312. Inverness, 169, 327, 328. Kincardine, 162, 167. Kirkcudbright, 126, 128, 306, 307. Lanark, 144, 145, 314. Nairn, 162, 167. Peebles, 132, 142, 309, 313. Perth, 153, 157, 320, 322. Ross, 169, 170, 328. Roxburgh, 126, 128, 306, 308. Selkirk, 132, 142. Stirling, 147, 151, 317, 319. Sutherland, 172.

IRELAND—Antrim, 188, 189, 335. Armagh, 188, 189, 336. Clare, 174, 331. CONNAUGHT, 186, 330, 334. Cork, 174, 175. Donegal, 188, 191. Dublin, 177, 178, 332. Galway, 186. Kildare, 177, 178, 333. Kilkenny, 177, 179. LEINSTER, 177, 330, 332. Louth, 177, 180. Mayo, 186. Meath, 177, 180. Monaghan, 188, 191, 337. MUNSTER, 174, 330, 331. Sligo, 186, 334. Tipperary, 174, 176. Tyrone, 188. ULSTER, 188, 330, 335. Wexford, 177, 182, 333. Wicklow, 177, 183.

† *Jl. of Hort.*, 1880. May 27th; ‡ Do., Ap. 8th and May 20th; § Do., Ap. 1st and May 20th; ¶ Do., May 13th; ** Do., May 27th; †† Do., April 29th and May 20th.

INDEX TO MIN. TEMPERATURES.

The following Temps. include additional fractional parts.

Degrees, Fahrenheit, are in black type; the figures denoting pages are in ordinary type.

ENGLAND and WALES. Winter 1879-80. **-16°**,105; **-12°**,105; **-11°**,90,105; **-10°**?78,98,105,112,113; **-9°**,103,105; **-8°**,104; **-7°**?23,99; **-6°**,75,96,104; **-5°**,40,42,76 (bis.), 87,89,105,107,109, 111,219; **-4°**,42,75 (bis.), 96,98,104,105; **-3°**,24,25,75,76,78,87, 219; **-2°**,71,76,97,100,103,104,105,112,209; **-1°**,29,41,45,72,88,104, 113,196,206,219; **0°**,9,23,36,37,38,75 (ter.), 76,79,81,82,83,85,92, 96 (bis.), 102,105,195,196 (bis.), 206,218,220,228; **1°**,31,35,41,62, 84,105 (bis.), 106,196,218,219; **2°**,23,31,48,79,96,97,100,101,196 (bis.), 216,218; **3°**,8,70,72,76,83,105,107,195 (bis.), 198,218,226; **4°**,35,67,73,77,91 (bis.),96,104 (ter.), 105,193,195,196,197,214,217, 218; **5°**,29,32,40,46,62,79,80,91,98,104,193,196 (ter.), 202,204,218 (ter.), 222,225,227; **6°**,1,21,47,74,87,104,105 (bis.), 111,120,195 (bis.),199,205,218; **7°**,1,12 (bis.), 13,24,27,71,96 (bis.), 101,105, 125,193,195,196,218,219 (bis.), 223,227; **8°**,5,8,21,37,38,55,64,69, 86,91,104,105 (bis.),113,124,193 (bis.), 195,196,219 (bis.); **9°**,3,20, 39,70,73,77,90,96,104 (bis.), 193,196 (bis.), 208,212,228; **10°**,7,8, 16,17,23,36,39,44,48,49,50,60,67,70,74,76,83,91,193,195,196 (ter.), 202; **11°**,17,23,38,53,61,67,70,105 (bis.), 116,193,195,196 (ter.); **12°**,2,16,24,50,60,61,91,121,193,195,224; **13°**,3,5,9,11,14,16,17,22, 43,50,54,60,61,68 (bis.), 91,195 (bis.), 196; **14°**,9,11,14,66,71,195, 196; **15°**,9,10,15,21,27,52,54,56,68,76,91 (bis.), 195,196; **16°**,21, 62,91,107 (bis.), 196; **17°**,9,11,20,21,49,52,62,104,116,118; **18°**, 10 (bis.), 11,27,49,55 (bis.), 57,104,116,119,196; **19°**,20,47,57,58, 91,97,116,122; **20°**,10,11,49 (bis.), 59,115,120,122,123; **21°**,54, 96,116,122; **22°**,52,54,59,62,91,105,115,118; **23°**,52,59,69,115; **25°**,8,96; **26°**,6,51,116; **27°**,196 (bis.); **28°**,115; **29°**,62; **31°**,51.

SCOTLAND. Winter 1879-80. **-23°**,132; **-18°**,126,129; **-16°**, 126 (bis.); **-14°**, 126; **-13°**,126 (bis.), 132,142; **-12°**,126 (quat.), 130; **-11°**,134; **-10°**,143; **-8°**,134*; **-7°**,142; **-6°**,128,132,133, 143; **-5°**,126 (bis.), 132; **-4°**,126,130,134*,166; **-3°**,132,164; **-2°**, 130,144,145; **-1°**,128,134*,141,144,154,161; **0°**,126,133,135,141,

* See Notes, pp. 134 and 143.

143,153,156; **1°**,126,139,162; **2°**,140 (bis.), 160,163,167; **3°**, 159,161; **4°**,127 (bis.),157,163,172; **5°**,150,159; **7°**,132,144,152, 153 (bis.), 164,171; **8°**,126,151,155,158; **9°**,156,171; **10°**,144 (bis.), 148,153; **11°**,161,169; **12°**,148,153,159,169; **14°**,126, 144,161 (bis.), 167; **15°**,144,161,165,172; **16°**,147,165,169; **17°**,170; **18°**,147,148,162; **19°**, 139,172.

IRELAND, winter 1879-80. **2°**,179; **6°**,177,183,188,191; **8°**, 179,188,190; **9°**,177,191; **10°**,177,184; **12°**,179,186,190,191; **13°**,178,190; **14°**,188 (bis.), 191; **15°**,174 (bis.), 175,176,183; **16°**,175,177 (bis.), 181,186,188,191; **17°**,188; **18°**,177,182; **19°**, 186,188,191; **20°**,190,191; **21°**,177,179; **23°**,177; **26°**,174; **28°**,186.

ENGLAND and WALES, winter 1880-81. **-13°**,288,294; **-11°**,288,294, 297,298; **-10°**,288,290,297,303; **-9°**,230,232,283,288 (bis.), 289; **-8°**,288,297,300; **-7°**,288,290; **-6°**,282,288 (bis.), 290; **-5°**,247, 261,276,291; **-4°**,264,265,276 (bis.), 277; **-3°**,236,247,283; **-2°**, 247,264 (bis.), 266,282,283,288,293,297 (bis.), 301; **-1°**,233,241, 247,260,265,282,283; **-0° 9**,247; **-0° 5**,276; **-0° 3**,247; **0°**,230, 247,249,251,258,273,276 (ter.), 288 (bis.), 293,297 (bis.); **1°**,230 (5),247,264 (bis.), 283 (bis.), 287 (bis.), 297,304; **2°**,230,234,237, 242,247,265 (bis.), 273,282,284,288,289,297; **3°**,230,235 (bis.), 236,237,240,244,248,252,261,264,269,282,288,297 (bis.), 300; **4°**, 230 (bis.), 233,247 (bis.), 248,262 (bis.), 265,276,288,292,297; **5°**,230,231,237,266,264,265,288,289,296; **6°**,237,239,245,264,276, 282,286,288,297,303; **7°**,235,265,283,288; **8°**,230,235 (bis.), 236 (bis.), 247,259,276,280; **9°**,230 (bis.), 265 (bis.), 276,282,291; **10°**,230,235 (bis.), 282; **11°**,235 (bis.), 243,298; **12°**,230,236 (bis.), 237,239,274,282; **13°**,281; **14°**,234,297,299; **15°**,235; **17°**,235; **19°**,282; **21°**,235; **22°**,235; **24°**,297.

SCOTLAND, winter 1880-81. **-22°**,309; **-17°**,306; **-16°**,306; **-15°**,309,313; **-13°**,313; **-12°**,309 (bis.), 310; **-11°**,309; **-10°**, 306,308; **-8°**,306,307,309,314; **-7°**,314,315; **-6°**,313,329; **-5°**,314, 320,328; **-4°**,320,321,325,326 (bis.), 328; **-3°**,309,312,328; **-2°**, 306,314,315,320,324; **-1°**,306,309; **-0° 5**,328; **0°**,317,319,320 (bis.), 323,325; **1°**,314,317,319; **2°**,309,310,320,322; **3°**,306, 309,310; **4°**,320,321,323,325,328 (bis.); **5°**,314,317,318,323; **7°**, 306,320 (bis.); **8°**,314,317; **10°**,317,318; **11°**,306,307; **13°**, 306; **15°**,317.

IRELAND, winter, 1880-81. **-6°**,334; **-2°**,330; **-1°**,330; **0°**, 330,331 (bis.), 336; **4°**,330 (bis.), 331 (bis.), 337; **6°**,330,331;

7°,330 ; **8°**, 330 (bis.) ; **9°**,330 (bis.), 331 (bis.), 335,336 ; **10°**,330 (bis.), 331,335 ; **11°**,331 ; **12°**,330,331.

INDEX TO PLANTS.

Observations—When only one species is named in the Reports, the generic name only is here given. Temp. printed thus **10°**,18 signify that the plant was injured at that temp. (or was not hurt if the prefix *uninj.* precedes it) and that a reference to it will be found on p. 18. Numbers to pages without any temp. preceding them indicate that the writer of the report has not recorded any, or else that (as a rule) it was not lower than **10°**; for in many cases the range of temp. was so great, and the number of records would have been so numerous, that it would have been superfluous to have referred to them all. In these cases, I have drawn up lists to show the number of times the plants were injured or uninjured, as the case may be, thus :—(b. z.—**0°**) 3 (1), 5 (2), 6 (3) &c. signifies that, from below zero up to zero, specimens of the plants were recorded to have been killed on three occasions (1), severely injured five times (2), and slightly injured six times (3). Being somewhat limited in space, I omitted from the later reports many plants which are thus repeatedly mentioned ; but in all cases they were counted in these enumerations last alluded to.

Occasional misspelt words are referred to by (*m*) attached to the number of the page: the names being taken from the records as sent, but verified as far as possible. Readers in consulting the Index in search of a particular plant should look for the vernacular name in cases where the plant is not entered under its scientific name and *vice versa*.

ABELIA floribunda, *uninj.*, 10 ; **A.** rupestris, **10°**,17, 206,211 ; *uninj.*, 181,210 ; **A.** triflora, 62,206 ; *uninj.*, **10°**,18, 211 ; **A.** uniflora, **10°**,18 ; *uninj.*, 22,181. **ABIES** (see also **PICEA**) *Albertiana* and *Obs.*, **8°**,5 ; **A.** *Alcoquiana*, *uninj.*, **10°**,97 ; **A.** *bracteata*, **1°**, 139 ; **A.** *canadensis*, **0°**,250, **10°**,97 ; *uninj.*, **10°**,39 ; **A.** *Douglasii*, **-2°**,266, **0°**,37, **2°**,234, (b.z.—**0°**), 1 (2), 9 (3), (**1°**—**10°**)

1 (1), 3 (2), 7 (3); *uninj.*, -13° , 295, -7° , 290, -5° 8, 89, -5° ? 44, 1° , 233, 2° , 216, 284, 5° , 203, 22*, 200; (b. z.— 0°) 6 (1° — 10°), 13; (11° — 20°) 10; as timber, 145; *A. Engelmanni*, *uninj.*, 10° ? 97; *A. excelsa*, 189; *uninj.*, 22*, 69; var. *Clanbrassiliana*, *uninj.*, 10° , 39; *A. glauca*, *uninj.*, 13° , 295; *A. Hookeriana*, *uninj.*, 10° ? 97; *A. Kämpferi*, *uninj.*, 10° , 202; *A. Menziesii*, *uninj.*, 10° ? 97; *A. Morinda*, -7° , 99, -4° , 98, 278, -2° , 266, -1° , 284, 0° , 273, 2° , 101, 284 322; (b. z.— 0°) 3 (1), 3 (2), 2 (3), (1° — 10°) 6 (2), 5 (3); *uninj.*, -13° , 295, 1° , 233, 2° , 216, 3° , 270, 22*; (b. z.— 0°) 2 (1° — 10°) 6; spring frosts, effect of, 39; *A. orientalis*, 6° , 47; *Obs.* on, *uninj.*, 10° , 39; *A. polita*, 0° , 249; *uninj.*, 97. ABUTILON, 10; *uninj.*, 8. ACACIA *affinis*, 175; *A. armata*, 10; *A. dealbata*, 10, 202; *A. longifolia*, 10; *A. melanoxydon*, *uninj.*, 149; *A. monophylla*, 5° , 203; *A. Nemu*, *uninj.*, 202; *A. nervosa*, *uninj.*, 6° , 303; *A. (ROBINIA ?)* *uninj.*, -6° , 89. ACANTHOPANAX, 63. ACANTHUS, 6° , 21; *uninj.*, 6. ACER *ampelopsifolium*, 255; *A. Negundo*, *varieg.*, -8° , 135, 6° , 21; *uninj.*, -6° , 89, 173; *A. palmatum*, 50; *A. palmatifidum*, 5° , 203; *A. polymorphum*, -13° , 294, and *E. winds*, 50; *uninj.*, 7° , 12, and *vars.*, 256; *A. Pseudo-Platanus*, -18° , 129; *A. rubrum*, 55.; (see also *Negundo*.) ACTINIDIA, 63. ADONIS *pyrenaica*, 28; *A. vernalis*, 2° , 242. ÆGLE, 63. ÆSCULUS (PAVIA) *indica*, *uninj.*, 10° , 48; *Æ. macrostachya*, *uninj.*, 10° , 48; *Æ. laciniata*, 7° , 27. ÆTHIONEMA, 10° , 18. AGAPANTHUS *Moorei*, 8° , 64; *A. umbellatus*, -1° 5, 141, 2° , 140, 10, 62, 122, 190; *uninj.*, 8. AGATHÆA, 181. AGAVE, (ALOE) 123, 331. AGNOSTUS, 10. AILANTHUS, 0° , 249, 1° 5, 106, 7° , 27. AJUGA, 108. AKEBIA, 50, 206; *uninj.*, 3° , 270, 10° , 18, 15° , 21, 208. ALATERNUS, 0° , 135. ALMOND, (AMYGDALUS, see also PEACH), -2° , 301, 0° , 273, 7° , 27; *uninj.*, -13° , 295, -5° 8, 89, -2° , 316, 0° ? 254, 2° 284, 9° , 209, 210. ALOE (AGAVE), 123, 331. ALOYSIA, -11° , 90, -10° , 303, -5° 8, 89, -2° , 301, 0° , 273, 1° , 304, 2° , 216, 3° , 198, 226, 241, 269, 4° , 197, 5° , 203, 141; (b. z.— 0°) 6 (1), 2 (2), 2 (3), (1° — 10°) 16 (1), 4 (2), 5 (3), (11° — 20°) 8 (1), 2 (2), 3 (2); *uninj.*, 15° , 200. ALSTRÆMERIA, 2° , 242; *A. aurea*, 10° , 18; *A. chilensis*, 10° , 18; *A. peruviana*, 10° , 18; ALTERNANTHERA, 9. ALTHÆA (HIBISCUS) *frutex* (See *H. syriacus*); *A. rosea*, 10° , 16; *uninj.*, 10° , 17. ALYSSUM, *uninj.*, 10° , 18. AMARYLLIS, 33, 55. AMICIA, 8° , 64, 62, 206, (*m*) 220. AMMOBIUM, 10° , 18. AMORPHA *angustifolia*, *A. crocea* and *A. glabra*, *uninj.*, 16° , 181; *A. croceo-lanata*, 13° , 178. AMPELOPSIS, 0° ? 102; *A.*

bipinnata, 80; *A. hederacea*, **-18°**, 129, **5°**, 136, 203; *uningj.*, **-13°**, 295, **-9°**, 232, **-2°**, 316, **2°**, 284, **5°**, 203, **9°**, 209, 254; *A. japonica*, (Veitchii) **-6°**, 329, **-5°**, 8, 89, **-2°**, 266, **-1°**, 284, **0°**, 135, 273, **1°**, 304, **3°**, 198, **5°**, 136, 220, 318, **6°**, 199, **9°**, 228, 265, **10°**, 83, 148, (b. z. —**0°**) 2 (1), 2 (2), 7 (3), (**1°—10°**) 2 (1), 2 (2), 11 (3); *uningj.*, **-18**, 130, **-2°**, 316, **1°**, 233, **2°**, 216, 284, **3°**, 270, **5°**, 222, **10°**, 18, 108, (b. z. —**0°**) 3, (**1°—10°**) 10, (**11°—15°**), *Obs.* on, 80; *A. Royleii*, **10°**, 18. *AMYGDALUS*, see ALMOND. *ANCHUSA capensis*, *uningj.*, **10°**, 18; *A. italica*, **2°**, 242. *ANDROMEDA arborea*, **10°**, 18, 211; *A. floribunda*, *uningj.*, **10°**, 84, 181, *A. japonica* and *A. pulverulenta*, *uningj.*, **10°**, 18, 22*, 59. *ANDROSACE lanuginosa* and *A. sarmentosa*, **10°**, 18. *ANEMONE japonica*, **2°**, 242; *uningj.*, 108; *A. narcissiflora*, 28; *A. Pulsatilla*, **2°**, 242; *A. vitifolia*, 28; *A.*, roots kd., 15. *ANONA*, 181. *ANOMOTHECA*, 183. *ANTHYLLIS*, **10°**, 18. *ANTIRRHINUM*, 84, 128; *uningj.*, 108. *APHYLLANTHES*, **10°**, 18, 62. *APONOGETON distachyon*, **3°**, 241, 52, 55, 181; *uningj.*, **3°**, 241, 22; *A. spathaceum*, **10°**, 19.

APPLES * **-18°**, 129, **-13°**, 129, **-12°**, 131, 142, **-11°**, 134, **-10°**, 112, **-8°**, 135, **-5°**, 110, **-3°**, 25, **-2°**, 112, 266, **-1°**, 45, 154, **0°**, 37, 81, 273. (b. z. —**0°**) 8 (1), 11 (2), 8 (3); (**1°—20°**) 8 (1), 12 (2), 23, (3), (**11°—20°**) (1), 9 (2), 1 (3); Age, effects of, 46, 93, 95, 190, 336. Canker in, 31; Do., due to frost, 93, 142, 151, 279. Crop, 1880, av., 41; def., 5 (bis), 9, 46, 51, 55, 58, 68, 69, 70, 106, 130, 150, 151, 160, 163; good, 79, 128; none, 37, 48, 67, 121, 156, 168, 189, 190: Crop, 1881, def., 197, 258. Frost, slow recovery from, 46, 112. Soil, stiff, effects of, 154; Do. dry and wet, 86, 190, 336. Wood unripened, &c., 51, 55, 84, 130, 150, 266, 272. *Vars. &c., injured*, Adam's Pearmain, 67; Alfriston, 67, 266; Blenheim Orange, 60, 93, 279; Burgess' Fame, 60; Calville blanche d'hiver, 279; Court Pendu Plât, 60; Cox's Orange Pippin, 279; *Dessert*, 111; Dumelow's seedling, 42, 43; D. T. Fish, 278; Dutch codlin, 279; Early Julien, 266; *Espaliers*, 44; Golden Harvey, 226; Golden Pippin, 190, 336; Keswick codlin, 111, 266 (bis); *Late* sorts, 84; Lord Burleigh, 278; Lord Suffield, 111, 266, 278; Manx codlin, 266; Norfolk Pippin, 60; Northern Spy, 279; Old Hawthornden, 25; Pitmaston's Pine, 60; Reine blanche, 60; Reinette du Canada, 60; Ribston Pippin, 60, 190, 226, 278, 336; Royal Pearmain, 60; *Tender*, 112; Wellington, 232: *Vars. uninjured*, Braddick's Nonpareil, 33; Codlins, 67, Cox's Golden Drop, and

Pomona, 33; Duchess of Oldenburgh, 33; Dutch Mignonne, 120; *Early*, 74; Fillbasket, 296; Gansels' Bergamot, 120; Glou Morecean, 120; *Hardier*, 110, 111, 151; Keswick codlin, 296; King of Pippins, 151; *Late* sorts, 74; Lord Suffield, 120, 151; Louise bonne, 120; Mannington's Pearmain, 120; Marie Louise, 120; Ribston Pippin, 120, 336; Sturmer Pippin, 33, 120, *Tender* sorts, 112; *uninj.*, 3° , 270, 5° , 203, 9° , 209, 33, 84, 200. (b. z.— 0°), 4; (1° — 10°) 14; (11° — 20°) 7. *Obs.* on, 46, 67, 110, 111, 151, 154, 155.

APRICOTS, -18° , 129, -13° , 129, -12° , 131, -11° , 90, 134, -7° , 99, -6° , 89, 329, -4° , 130, -2° , 266, -1° , 5, 141, -0° , 81, 156; (b. z.— 0°) 8 (1), 11 (2), 10 (3); (1° — 10°) 4 (1), 12 (2), 13 (3); (11° — 20°), 2 (1), 2 (2), 2 (3); *uninj.*, (b. z.— 0°) 2, (1° — 10°) 12, (11° — 20°) 10. Age, effects of, 68, 80, 266, 278; Bark ruptured, 262; Crop, 1880, av. or fair, 41; def., 68, 79, 120; good, 67; none, 5, 155; Frost, recovering from, 155; Vars., Moorpark, -4° , 278; Siberian and vulgaris, -13° , 294; Wet, effects of, 68, 80. AQUILEGIA, 108. ARABIS, 108. ARALIA chinensis, *syn.* A. mandshurica, (Dimorphanthus m.) 1° , 5, 106; A. heterophylla, 51; A. intermedia, 181; A. neriifolia, 183; A. pentaphylla, 208; A. Sieboldii, *syn.* A. japonica and Fatsia japonica,† -2° , 301, 1° , 304, 2° ?, 106, 216, 3° , 252, 269, 5° , 222, 7° , 27, 125, 227, 10° , 18, 34; (b. z.— 0°) 2 (1), (1° — 10°) 10 (1), 3 (2), 3 (3), (11° — 20°), 3 (1), 5 (3); *uninj.*, 1° 30, 3° , 270, 5° ?, 208, 8° , 65, 18° , 10, 20° , 173; Do. varieg., 15° , 53; A. spinosa, 2° , 31, 8, 34, 119, 206; *uninj.*, 8° , 65. ARAUCARIA Cookii, 15° , 10; A. excelsa, 175; A. imbricata, -18° , 129, -13° , 129, -12° , 131, 142, -11° , 134, -10° , 303, -9° , 232, 289, -8° , 300, -6° , 89, 329, -5° , 110, -3° , 164, 0° , 79, 82, 102, 273, 1° , 139, 304, 2° , 101, 167, 3° , 166, 226, 269, 4° , 73, 127, 5° , 98, 203; (b. z.— 0°) 15 (1), 17 (2), 6 (3), (1° — 10°) 4 (1), 15 (2), 25 (3), (11° — 20°) 2 (1), 4 (2), 3 (3); *uninj.*, 0° , 82, 2° , 216, 3° , 270, 5° , 222, 7° , 125, 9° , 209, 10° , 39, 22*, 118, 121; (b. z.— 0°) 5 (1° — 10°) 12, (11° — 20°) 15. *Obs.*, Elevated ground, 82; Growth of, 191; Soil, dry, 82, 101; Do., wet, 82. ARBUTUS, -6° , 89, 143, -4° ?, 41, 166, -2° , 103, 1° , 154, 0° , 37, 38, 79, 1° , 31, 35, 2° , 141, 7° , 13, 8° , 124, 10° , 7, 8, 9, 16, 34; *uninj.*, 2° , 141, 109, 117; A. Andrachne, -11° , 90, -10° , 303, -2° , 301, 0° , 302, 2° , 322, 3° , 269, 300, 4° , 197, 5° , 204, 6° , 199, 223; *uninj.*,

† Acc. to Bentham and Hooker. *Gen. Plan.*; see also Hemsley's *Handbook of hardy trees*, &c., p. 214; but almost invariably known to the Authors of the Reports as A Sieboldii.

10°, 19, 22*, 208, 210, 211; *A. Croomii*, **10°**, 74; *A. hyb.*, **-1°**, 30, 208; *A. procera*, **3°**, 269, **4°**, 197, 321, 106, 211, 237; *uninj.*, **10°**, 19, 210; *A. quercifolia*, **10°**, 19, 212; *A. rubra*, **5°**, 150; *A. Unedo*, **-11°**, 90, **-3°**, 25, **-1°**, 5, 141, **-1°**, 30, **0°**, 220, 273, **1°**, 139, **2°**, 216, **3°**, 226, 241, 269, **4°**, 73, 197, 217, **5°**, 29, 136, 203, 231, *A. V. var. tomentosa*, 178; (*b. z.*—**0°**) 13 (1), 8 (2), 3 (3), (**1°**—**10°**) 29 (1), 29 (2), 8 (3) (**11°**—**20°**) 9 (1), 20 (2), 3 (3); *uninj.*, **1°**, 233, **10°**, 48, **15°**, 21, 200; (*b. z.*—**0°**) 0, (**1°**—**10°**) 3, (**11°**—**20°**) 8; *Obs.*, 9, 16, 141, 150, 273. *ARDISIA*, **-13°**, 294; *uninj.*, **16°**, 63. *Arisæma*, **8°**, 65. *ARISTOLOCHIA altissima*, **5°**? 206; *A. Kämpferi*, **10°**, 19; *A. rotunda*, **16°**, 4, 63; *A. sempervirens*, **10°**, 318, **12°**, 148; *A. Siphon*, **-11°**, 134, **-9°**, 232, **-6°**, 89, **2°**, 216, **4°**, 323; *uninj.*, **-13°**, 295, **-3°**? 254, **-2°**, 316, **3°**, 270, **9°**, 209, **15°**, 200, 22*, (**1°**—**10°**) 5. *ARISTOTELIA Macqui*, **-1°**, 30, **5°**? 207, **13°**, 178; *uninj.*, **16°**, 181; *A. racemosa*, **5°**? 207. *ARMERIA*, 242. *ARONIA*, **16°**, 181. *ARTICHOKE*, globe, (*b. z.*—**0°**) 16 (1), 15 (2), 2 (3), (**1°**—**10°**) 15 (1), 43 (2), 13 (3), (**11°**—**20°**) 4 (1), 5 (2); *uninj.*, (**1°**—**10°**) 2, (**11°**—**20°**) 4. *ARUM*, 64. *ARUNDINARIA*, (*m*) 109. *ARUNDO conspicua*, **-13°**, 129, **-10°**, 303, **-2°**, 301, **0°**, 82, 273, (*b. z.*—**0°**) 3 (1), 2 (2), (**1°**—**10°**) 3 (1), 3 (2), 1 (3), (**11°**—**20°**) 1 (1), 1 (2), 3 (3); *uninj.*, (**1°**—**10°**) 3; *A. Donax*, **-2°**, 301, **-1°**, 30, (*b. z.*—**0°**) 3 (1), 2 (2), (**1°**—**10°**) 3 (1), 3 (2), 1 (3), (**11°**—**20°**) 1 (1), 1 (2), 3 (3); *uninj.*, (**1°**—**10°**) 2, (**11°**—**20°**) 2. *ASARUM*, **10°**, 19. *ASCLEPIAS*, **10°**, 18. *ASH*, **-18°**, 129, 37. *ASIMINA*, **-1°**, 30. *ASPARAGUS*, **-15°**, 314, **-7°**, 99, **-6°**, 89, **-2°**, 266, **0°**, 81, 82, 228, 280, (*b. z.*—**0°**) 16 (1), 15 (2), 2 (3), (**1°**—**10°**) 15 (1), 43 (2), 13 (3), (**11°**—**20°**) 4 (1), 5 (2); *uninj.*, **-9°**, 232, **5°**, 222, **9°**, 209, 200, 203, 254; (*b. z.*—**0°**) 4, (**1°**—**10°**) 12, (**11°**—**20°**) 6; *A. acutifolius*, **10°**, 19; *A. racemosus*, **8°**, 65; *A. tenuifolius*, **10°**, 19. *ASPHODELUS*, **10°**, 18, 6. *ASPIDIUM*, 149. *ASPLENIUM*, 149. *ASTER argophyllus*, 51; *A. grandiflorus*, 28; *A. sericeus*, 28; *A. sikhimensis*, 220. *ASTILBE* **10°**, 19. *ASTRAGALUS*, **10°**, 19. *ATHROTAXIS*† *imbricata*, (*m*) **-13°**, 295; *A. selaginoides*, 212. *ATRIPLEX*, 207. *AUBRIETIA*, (*m*) 108. *AUCUBA himalaica*, **4°**, 73; *A. japonica*, and vars., **-18°**, 129, **-13°**, 129, 134, **-11°**, 90, **-10°**, 98, **-7°**, 99, **-6°**, 89, **-5°**, 107, 109, 110, **-4°**, 42, 98, **-3°**, 25, **-2°**, 103, 112, **-1°**, 41, 45, 141, 154, **0°**, 79, 81, 82, 83, 135, 156, 221, 228, (*b. z.*—**0°**) 15 (1), 47 (2), 14 (3), (**1°**—**10°**) 19 (1), 46 (2), 39 (3), (**11°**—**20°**) 4 (1), 9 (2),

† Usually but erroneously spelt *Arthrotaxis*.

12 (3); *uningj.*, 0°82, 1°233, 14,22*,117,200,210,254. *AZALEA* *amæna*, -2°301, 2°216, 3°198,269, 5°136, 6°286, 13°, 95,178, 22°,201; *uningj.*, -13°295, 4°215, 14°299, 15°,53,200, 22*,181, 212; Hybs. of,214; (1°—10°) 4, (11°—20°7; Amer. types, 214; *A. indica*, -4°,278, 0°302, 3°198,269, 4°214, 5°231, 59,60,117, 178; *uningj.*, -7°290, 9°209, 10°84, 6,59,117, and vars. 181,200, 213,214, (b. z.—0°) 2, (1°—10°) 4, (11°—20°) 6; *A. mollis*, 214; *A. pontica*, 214; *Obs.* on, 214. *AZARA crassifolia*, -13°, 294; *A. dentata*, -13°,294; *A. Gilliesii*, -13°,294, 13°,178; *uningj.*, 14°,299; *A. integrifolia*, 1°,139; *uningj.*, 16°,181; *A. microphylla*, b. z. [?] 255, 0°82, 1°304, 2°31, 3°252, 211,246,294; *uningj.*, 0°82, 7°125, 13°,22, 12°,117; *A. parviflora*, 10°,18.

BACCHARIS, 22. *BALSAMITA*, 18°,10. *BAMBUSA*, 2°31, 191; *B. edulis*, 10°,18; *B. Fortunei*, -2°301, -1°284, 2°216, 3°198, 241, 5°136,203, 12°,117,191, 117; 3°270, 12°,200,237, 14°, 299, 15°,200; *B. gracilis*, 5°318, 15°,54; *B. Kumasasa*, *uningj.*, 63; *B. Metake*, 0°82; *uningj.*, 5°318, 15°,56, 16°63, 18°,57, 9; *B. nigra*, 10°,18; 15°,54; *B. tessellata*, 16°4,62. *BANKSIA australis*, 15°,10. *BARBAREA*, 28. *BEANS*, scarl. run., 0°38. *BEECH*, -18°, 129, *B.*, copper, 2°179. *BEET*, 1°,106,162. *BEGONIA*, 18°,183. *BELLIS coerulescens*, 10°,19; *B. minima*, ? 6°303; *B. perennis* (*Daisy*), 2°79, 7°12, 108,122; *B. p.* var. *coerulea*, 9°6,334; *B. sylvestris*, 10°,18. *BELLIUM*, *uningj.*, 6°303, 10°,19. *BENTHAMIA*, -1°5,141, 1°,139,233, 7°27, 10°,18,202, 13°,22, 178, 22*,175, 176,211,223; *uningj.*, 3°270, 12°,237. *BERBERIDOPSIS*, 0°302, 3°252, 4°217, 5°203,318, 7°12, 12°,?123, 21°,50, 223,255; *uningj.*, 3°270, 10°,202, 12°,117,237, 13°,22, 15°,200.

BERBERIS (including *MAHONIA*), -8°135, -9°103, *uningj.*, 13°, 22,59; *B. acanthifolia*, 10°318; *B. actinacantha*, 10°,19; *B.* (*American*), 8°,113; *B. angulosa*, 207; *B. aquifolia*, 9°212 (*MAH.*),108; *uningj.*, 0°250; *B. aristata*, 5°203, 256; *uningj.*, 10°,19; *B. asiatica*, 207,285; *uningj.*, 10°,19; *B. Bealii*, 5°136, (*MAH.*), 7°125, 15°,176; *uningj.*, 16°,181; *B. concinna*, 207; *B. coriacea*, 207; *B. Darwinii*, -18°,129, -13°,129, -11°,90, -10°,113, -7°,99, -6°89, -2°103,266, -1°30,45, 0°82,135,221, 14,109, 249, (b. z.—0°), 14 (1), 20 (2), 5 (3) (1°—10°), 13 (1), 33 (2), 14 (3), (11°—20°) 2 (1), 9 (2), 5 (3); *uningj.*, 9°209, 10°39, 12°,237, 13°,22, 16°,181, 210, (1°—10°) 7, (11°—20°)

10. *B. dulcis*, -18° , 129, 10° , 83; *uninj.*, 16° , 181, 285; *B. empetrifolia*, 16° , 181, 285; *B. fascicularis*, 256; *B. fuchsoides*, 207; *B. glauca*, 207; *B. glaucescens*, 207; *B. glumacea (nervosa)*, 256; *B. ilicifolia*, 5° , 207, *uninj.*, 5° , 203; *B. Jamesoni*, 3° , 166, 10° -5, 60, 187; *B. japonica*, -4° , 278, -2° , 266, -1° , 284, 0° , 102, 302, 1° , 304, 2° , 216, 284, 3° , 241, 4° , 35, 5° , 222, 6° , 286, 12, 109, (b. z.— 0°), 1 (1), 2 (2), 4 (3), (1° — 10°), 1 (1), 4 (2), 6 (3); *uninj.*, 4° , 215, 3° , 270, 12° , 238, 22*, 200, 212, 299, (1° — 10°) 6, (11° — 20°) 8; *B. Knightii*, 64, 207; *B. Lycium*, 207; *B. macrophylla*, 305; *B. nepalensis*, 299; *B. Neuberti*, *hyb.*, 3° , 166; *B. purpurea*, 181; *B. Simonsii* and *vars.*, -13° , 129; *B. stenophylla*, -7° , 99, -6° , 89, 102; *uninj.*, 1° , 305, 7° , 125, 16° , 181; *B. stolonifera*, 232; *B. virgata*, 207; *B. vulgaris*, -11° , 134, 2° -2, 273, 7° , 125; *uninj.*, -9° , 232, 1° , 233, 3° , 270, 4° , 215, 5° , 222, 9° , 209, 22*, 200, 210, 212, 285, (1° — 10°) 10; (11° — 20°) 7; *B. Wallichii*, 0° ? 102, 207; *uninj.*, 14° , 299, 16° , 181.

BETULA (Birch), 7° , 27. *Bignonia*, 10° , 184, 12° , 123; *B. capreolata*, 16° , 62; *uninj.*, 208; *B. grandiflora*, 1° , 31, 12° , 148; *uninj.*, 181; *B. radicans*, 0° ? 102. BIOTA (see THUJA) *Meldensis*, 0° , 249; *B. occidentalis*, 6° , 303. *B. orientalis*, -4° , 278, -2° , 266, -1° , 45, 0° ? 102, 273, 302, 3° , 300, 6° , 286, 6° -5, 240, 6° -9, 245, 10° , 39, 12° , 191, 106; *B. o. vars.*, *antarctica*, 60; *aurea*, 0° , 38, 102, 7° , 101, 8° , 37, 10° , 83, 23° , 69; *elegantissima*, 0° ? 102, 3° , 246; *falcata*, 10° -5, 60; *incurvata*, 10° -5, 60; *semperaeurescens*, -13° , 294; *uninj.*, -7° , 290, 1° , 233, 2° , 284, 3° , 270, 4° , 215, 5° , 222, 9° , 209, 213, 22*, 121, 200, 246, 254, 299; *vars.*, *aurea*, 22*; *elegantissima*, 17, &c., 39. BLACKBERRY (see RUBUS), *Amer.*, 9° , 95, (*Bramble*) *varieg.*, 129. BOCCONIA, 10° , 19. *Bœhmeria*, 22*, 62. BOLTONIA, 16° , 181. *BOMAREA acutifolia*, 5° , 203; *B. Salsilla*, 8° , 65. BORECOLE, *var.*, -15° , 314. -11° , 90, -10° , 303, -2° , 266, 0° , 221, 273, 1° , 219, 3° , 198, 269, 4° (*vars.*), 127, 197, 5° , 222, 7° , 227, 53, 122, 254, (b. z.— 0°) 14 (1), 10 (2), 1 (3), (1° — 10°) 15 (1), 15 (2), 8 (3); *uninj.*, -2° (*vars.*) 301, 2° , 216, 9° , 209, 59, 200, *vars.*, of merit, 70, 301. BORYA, 211. *Boussingaultia*, 10° , 63, 10; *uninj.*, 14° , 299. *Bouvardia*, 18° , 10. BOX (see BUXUS semp.). BOYKINIA, 10° , 19. BRAVOA, 10° , 18. BRIDGESIA (ERCILLA), 207; *uninj.*, (*m*) 10° , 19, 16° , 181. *Brodiaea*, 8° , 64. BROUSSONETIA *Kämpferi*, 19; *B. papyrifera*, 16° , 187, 22*, 109, 212, 223. BRUGMANSIA *lutea*, 28; *B. sanguinea*, 0° , 273, 302, 8° , 64, 28, 220, 254 *uninj.*, 14° , 299, 18° , 10.

BRUSSELS SPROUTS, -15° , 314, -12° , 142, -11° , 90, -10° , 304, -8° , 135, 300, -6° , 89, -5° , 291, vars., 323, -2° , 266, -1° , 45, 0° , 221, 273, 1° [?], 106, 1° , 162, 2° , 216, 273, 3° , 198, 4° , 127, 233, 5° , 222, 227; (b. z.— 0°) 19 (1), 9 (2), 3 (3), (1° — 10°) 19 (1), 17 (2), 13 (3), (11° — 20°) 3 (1), 4 (2), 1 (3); *uninj.*, 2° , 301, -1° , 5, 142, 2° , 141, 160, 3° , 270, 4° , 215, 5° , 203, 222 9° , 209, 59, 238 (1° — 10°) 12, (11° — 20°) 3; var. Roseberry's, 66. BRYANTHUS, 207. BUD-
DLEIA curvifolia, 207; B. globosa, -1° , 30, 285, 1° , 106 (bis.), 2° , 216, 3° , 241, 4° , 214, 217, 5° , 80, 159, 203, 222, 227, 6° , 47, 7° , 27, (b. z.— 0°) 7 (1), 2 (2), (1° — 10°) 19 (1), 6 (2), 2 (3); *uninj.*, 10° ? 2, 19, 14° , 299, 22*, 117; B. intermedia, 207; B. Lindleyana, 3° , 241, 5° , 204, 10° ? 2, 18, 318, 21, 207, 211, 223. BUPLEURUM, 1° — 5° , 106, 3° , 244, 10° — 5° , 60, 211, 223, 246; *uninj.*, 10° , 19, 14° , 299, 22*. BUTYRUS balearica, -1° , 30, 0° , 302, 2° , 179, 3° , 198, 5° , 203, 222, 7° , 12, 34, 106, 201, 223; *uninj.*, -2° , 316, 2° , 284, 3° , 270, 4° , 215, 22*, 208, 212; B. japonica, 295; B. sempervirens (Box), -18° , 129, -13° , 129, -12° , 131, -11° , 134, -9° , 232, -8° , 135, -7° , 99, -6° , 89, -5° , 110, -3° , 25, -2° , 266, -1° , 154, 0° , 92, 3° , 198, var. golden &c. 102, (b. z.— 0°) 10 (1), 1 (2), 6 (3), (1° — 10°) 2 (1), 2 (2), 4 (3); *uninj.*, -2° , 316, 1° , 233, 3° , 270, 4° , 215, 5° , 203, 7° , 245, 9° , 209, 22*, 59, 200, 210, 212, 248, 254; (b. z.— 0°) 7, (1° — 10°) 9, (10° — 20°) 8; *Obs.*, exposed and sheltered, -7° , 99.

BROCCOLI,† Adam's Dalmeny, 302; A.'s early white, -1° , 88, 241, 3° , 241, 15° , 54, 298. Backhouse's late, -15° , 314, 9° — 4° , 336, 4° , 263, (m.) 190; B.'s Winter White, 2° , 284, 5° , 318, 8° ? 229; *uninj.*, 4° , 321. Burleigh Champion, 262. Carter's Champion, -3° ? 257, 3° , 241; *uninj.*, 10° , 335; C.'s Early Spring and Summer, -10° — 5° , 290; C.'s Late White, 1° , 219, 4° , 263. Cattell's Eclipse, -5° , 291, -1° , 88, 0° , 319, 337, 3° , 241, 269, 5° , 204, 6° , 286, 15° , 54; *uninj.*, -3° — 5° , 313, -1° — 5° , 141, 3° , 252, 5° , 203, 231, 7° , 152, 10° ? 335, 12° ? 275, 17° , 52. Champion late white, 4° , 333. Chapel's cream, 3° , 241, 15° , 54. Deal white, 5° , 204. Dickson's late, 23° , 70. Dilcock's bride, -3° — 5° , 313, -2° , 324, 3° , 252, 4° , 262, 5° , 318, 6° , 286, 8° , 229, 15° ? 298; *uninj.*, 5° , 231. Drummond's late white, 336. Early vars., 8° , 37, 15° , 54. Elletson's Mammoth, -2° , 324, 8° ? 229, 14° , 66, 15° , 54. Frogmore protecting, 0° , 337, 3° , 269. Gilbert's Excelsior, 262. Gordon's, -15° , 314. Goschen, late white, 313. Grange's autumn,

† See *Jl. of Hort.*, 1880, pp. 269, 330, 370, 388: *Gard. Chron.*, 1880.

4°,333. Handsworth's white, 2°,284. Hill's June, 2°,284. Knight's protecting, -6°,334, -5°,291, -1°,88, 0°?271,337, 3°,241, 5°,231, 14°,66, 23°,70; K.'s variegated, -8°,135. Lander's Goshen, -15°,314, 4°,263, 5°,318, 12°,224; *uninj.*, 3°,252, 5°,231; L.'s protecting white, -2°,324. Lang's Late white, 4°,321. Late vars., 1°,163, 8°,37. Late white, 5°,204. Leamington, -3°·5,313, -1°,88, 1°,219, 3°,252,269, 4°,262,263, 5°,80,204, 6°,286, 8°,179,229, 10°?337, 15°?298; *uninj.*, 17°,52. Mackey's, 4°,333. May Queen, 4°,321. Miller's dwf., 5°,204. Model, 0°,337, 4°,263, 6°,286, 10°,337; *uninj.*, -3°·5,313, 0°,228, 3°,252, 5°,231. Nicholson's, 9°?232. Osborne's dwf., 12°,275; O.'s white, -6°,290, 0°?271. Penzance early, -2°,324, -1°?241, 1°,219, 3°,241,252, 269, 5°,204,231; P. white, 0°,337. Purple, 7°,12, 14°,66; P. Early sprouting, -6°,334, -3°,257, 3°,241, 6°,286, 8°?,229, 9°?232. Snow's Early, 3°,269; S.'s Superb White, 5°?204,318, 6°,286; S.'s Winter White, -10°,290, -6°,334, 0°,337,271, 2°,284, 3°,241,252, 4°,263,333, 5°,231, 8°,179, 10°?337, 12°,224, 14°,66, 17°,190. Spring, 0°,337, 11°,38. Surprise, -4°?278. Sutton's late Green (Queen ?), 5°,80,204, (m) 14°,66, -5°,261, 9°·4,336; S.'s Perfection, 0°?271, 5°?204,318, 10°,335; S.'s Protecting, 14°,66; S.'s Reading Giant, 14°,66. Veitch's Aut., -3°?257, 0°,337, 3°,269, 10°,327, 11°?38; V.'s Self-Protecting, -6°,290, 4°,262, 5°,80,318, 6°,286, 9°,265, 12°,239; *uninj.*, 9°?20; V.'s Spring White, -3°·5,313, 1°,219, 4°,263, 6°,286, 10°?337, 12°,239; V.'s Welcome, 15°,56; *uninj.*, -1°?242. Walcheren, -6°,334, 0°?302, 17°,190, Watts' Excelsior, 262. Wilcock's, -3°,257. Wilcove white, 14°,66, 15°?298. Williams' Alexandra, 0°,319, 9°,171. Winter, 11°,38. —(b. z.—0°), 42 (1), 6 (2), 1 (3), (1°—10°), 90 (1), 21 (2), 3 (3), (11°—20°), 21 (1), 11 (2), 4 (3). Vars. unnamed, *uninj.*, -6°,143, -2°,301, 5°,138, 13°,22, 52,121.

CABBAGE, -12°,142, -11°,90, -10°,304, -8°,135, -6°,89,329, -4°,42, -1°,41,45,141,250, 0°,81,274, 1°,106,162, 164,304, 3°,198,226, 4°,35,197, 5°,225,227, 6°,199, 7°,165, 8°,190, 9°,265, 10°,7,43; (b. z.—0°), 19 (1), 10 (2), 6 (3), (1°—10°), 22 (1), 29 (2), 15 (3); *uninj.*, vars., -2°,301, 3°,270, 4°,215, 5°,203, 43, 59,121. Greens, 1°,162; Do. German, -8°,135, 1°,164; Do. Major, -0°·3?,250; Do. winter, -12°,142, -1°,41. Pickling, 9°,265;

uningj., 43. SAVOYS, **-12°**, 142, **-8°**, 135, **-1°**, 45, **1°**, 162, **4°**, 35, **7°**, 101, **9°**, 265; *uningj.*, **2°**, 160; Vars. named, **-12°**, 142, **-8°**, 135, **-4°**, 42, **1°**, 162, 164, 304, **9°**, 265, 43, 250; *uningj.*, **-2°**, 301. CACCINIA, 19. CALANDRINIA, **2°**, 242. CALCEOLARIA, 51; *C. chelidonioides*, 181; *C. crenatiflora*, 65; *C. violacea*, 202. CALLISTEMON, **1°**, 139; *uningj.*, (*m*) 120. CALOCHORTUS, **8°**, 64; *uningj.*, **8°**, 65, **18°**, 10. CALOPOGON, **7°**, 12. *Calycanthus floridus*, (see CHIMONANTHUS) **8°**, 179, **10°**, 18, 4; *C. grandiflorus*, 176. Camellia, **3°**, 198, 241, 269, **4°**, 214, **6°**, 205, 303, **7°**, 125, **10°**, 145, 148, 178, 200, (**1°—10°**) 1 (1), 4 (2), 8 (3), (**11°—20°**) 3 (1), 3 (2), 9 (3); *uningj.*, **1°**, 305, **7°**, 125, **10°**, 202, 8, 10, 22*, 53, vars., 57 and 149, 210, 238, (**1°—10°**) 4, (**11°—20°**) 10. *Obs.*, on high and low ground, &c., 14, 57, 152; shy bloom, 51, 57. CAMPANULA pulla, 10; *C. pyramidalis*, 28. CAMPHOROSMA, 208. CANNA, **8°**, 64, 63. CANDIANDRA, (*m*) 211; *uningj.*, **10°**, 19. CANTUA dependens, **8°**, 64, 10, 63; *uningj.*, 10. CAPPARIS, 63; *uningj.*, 181. CARAGANA, 181. CARNATIONS, **-15°**, 314, **-6°**, 89, **2°**, 284, **4°**, 73, **5°**, 204, 227, **6°**, 199, **10°**, 202, **12°**, 191, 223; vars., 202; *uningj.*, **4°**, 215, **5°**, 203, 200, 248. CARPENTERIA, 212. CARROT, 69. CASSIA bifoliata, 212; *C. corymbosa*, 10; *C. marilandica*, **10°**, 18, 63. CASSINIA fulvida, *uningj.*, **5°**? 208, **10°**, 19; *C. leptophylla*, 178. CASTANEA vesca (SPANISH CHESNUT) **-18°**, 129, **-13°**, 294, **-12°**, 131, **-11°**, 134, **10°**, 84; *uningj.*, **-2°**, 316, **4°**, 215, **5°**, 203, 222, **9°**, 209, 22*; *Do.* var., *chrysophylla*, **3°**, 252, 181; *Do.* varieg., **-13°**, 294. CASTILLEJA, 181. CASUARINA quadrivalvis, 149; *C. tenuifolia*, 56. CATALPA bignonioides, 17; *C. Kämpferi*, **-13°**, 294, 34; *C. syringæfolia*, **-13°**, 294, **-6°**, 89, **2°**, 216, **3°**, 269, **4°**, 73, **5°**, 136, 203, 222, 227, 231, **7°**, 12, 22, 27, **9°**, 209, **11°**, 94, 106, 187, 215, (*b. z.—0°*) 1 (1), 2 (2), 1 (3), (**1°—10°**) 5 (1), 7 (2), 3 (3); *Do.* var. *aurea*, **-13°**, 294, **2°**, 216, **7°**, 22, 27, **9°**, 228, **10°**, 202, 201; *uningj.*, **-4°**, 215, **5°**, 222, 22*, 200, 212, 299, (**1°—10°**) 3, (**10°—20°**) 14; *Obs.* on, 94, 209, 222. CATANANCHE, 181. CAULIFLOWER, **-6°**, 89, **-2°**, 266, **0°**, 79, 274, **3°**, 198, **4°**, 214, 233, **6°**, 199, 201, 215, 223; *uningj.*, **-2°**, 142, **2°**, 284, **3°**, 270; vars., Autumn Giant (*Veitch's*), 204, 299; Dwarf Erfurt, **-15°**, 314, **-8°**, 324, 327; Early Dwarf (*Veitch's*), 204; E. D. Mammoth (*Veitch's*), **-3°** 5, 313; Late (*Veitch's*), 257; Early London, **-15°**, 314, **-8°**, 324, **-3°** 5, 313, 275, 299, 327, 331; Lenormand's, 327; Stadholder, **-8°**, 324; Walcheren, 299.

CEANOTHUS, **-7°**, 142, **-1°** 5, 141, **0°**, 38, **2°**, 164, **12°**, 117, 109;

Obs., 158; *C. americanus*, **-2°**,301, **-1°**,285, **0°**,302, **3°**,198, **4°**,321, **5°**,80, 223,237; *uninj.*, **3°**,270, **16°**,181; *C. azureus*, **-4°**,278, **-2°**,266, **-1°**,285, **0°**?36, **1°**,106,139, **3°**,166,198,269, **4°**,217,321, **5°**,318, **8°**?55, **9°**?20, **10°**,60,148, **11°**,94, **13°**,95, **15°**,56,119,211,223; (b. z.—**0°**) 4 (1), 5 (2), (**1°—10°**) 13 (1), 7 (2), 4 (3), (**11°—20°**) 3 (1), 3 (2), 4 (3); *uninj.*, **13°**,22, **16°**,181, (**11°—20°**) 5; *C. dentatus*, **0°**,302, **3°**,198,269, **4°**,73,321, **5°**,80, *C. d.*, *var.*, *superbus*, 8, 123,200,211,223,237; (**1°—10°**) 9 (1), 6 (2), (**11°—20°**) 3 (1), 3 (2), 4 (3); *C. divaricatus*, **13°**,22, **15°**,21, 211; *uninj.*, 181; *C. floribundus*, **15°**,176; *C. grandiflorus*, **3°**,198, **12°**,237, **15°**,200,223; *uninj.*, **3°**,270; 181; *C. hybridus*, **10°**.5. 60; *C. integerrimus*, **5°**,318; *C. ovatus*, 211; *C. thyrsiflorus*, **10°**,18; *C. Veitchii*, 119; *C. velutinus*, 212. **CEDRONELLA**, **10°**,18.

CEDRUS Atlantica, **-11°**,134, **-10°**,304, **-9°**,289, **-8°**,300, **-6°**,329, **-4°**,278, **-2°**,266, **-1°**,30, **1°**,304, **3°**,198, **4°**,73,197, **5°**,204, **6°**,303, (b. z.—**0°**) 2 (1), 4 (2), 1 (3), (**1°—10°**) 1 (1), 1 (2), 10 (3); *uninj.*, **1°**,233, **3°**,72,270, **4°**,215, **5°**,222, **7°**,125. *C. Deodara*, **-18°**,129, **-13°**,129, **-12°**,131, **-11°**,90,134, **-10°**,98,304, **-9°**,103,289, **-8°**,135,300, **-7°**,99, **-6°**,89, **-5°**,109,110, **-4°**,42,278, **-3°**,25,164, **-2°**,266, **-1°**,30,41,45, **0°**,36,38,79,81,82,92,274; *Obs.*, 30; *vars.*, **1°**,31; (b. z.—**0°**) 19 (1), 28 (2), 9 (3), (**1°—10°**) 15 (1), 31 (2), 25 (3), (**11°—20°**) 2 (1), 7 (2), 4 (3); *uninj.*, **-5°**,8,89, **0°**,82,92, **1°**,233, **2°**,284, **3°**,160, **4°**,215, **5°**,222, **7°**,125, **8°**,179, **9°**,209, **10°**,48, 109,121,200,299; *uninj.*, (b. z.—**0°**) 6, (**1°—10°**) 16, (**11°—20°**) 11; *Obs.*, degrees of inj., 30; high and low sites, 14, 30, 34, 82; loss of foliage, 258, 263; sheltered, 92; soil dry, 92; do. wet, 81; *C. Libani*, **-11°**,90,134, **-4°**,278, **0°**,82,228,274, **1°**,304, **2°**,234, **3°**,198,269, **4°**,73,127, **6°**,47, **8°**,5, **10°**?37, 6,16,191,237, (b. z.—**0°**) 2 (1), 4 (2), 7 (3), (**1°—10°**) 1 (1), 6 (2), 11 (3), (**11°—20°**) 7 (2), 4 (3); *uninj.*, **1°**,233, **2°**,284, **4°**,215, **7°**,125, **10°**,48, 299,212, (**1°—10°**) 9, (**11°—20°**) 5; *Obs.*, foliage, lost, 16,78,258; sheltered, 82; soil, cold and wet, 269. **CELASTRUS**, 181. **CELERY**, **-15°**,314, **-12°**,142, **-11°**,90, **0°**,38,43,81,221,228,274, (b. z.—**0°**) 13 (1), 11 (2), 3 (3); (**1°—10°**) 12 (1), 20 (2), 7 (3), (**11°—20°**) 1 (1), 5 (2), 2 (3); *uninj.*, **-9°**,232, **5°**,138, **9°**,209, 200; *vars.*, Laing's Mammoth, Manchester, **-15°**,314; Leicester red, *uninj.*, **-5°**,323. **CELTIS**, 19. **CENTAUREA**, 117; *C. gymnocarpa*, 181; *uninj.*, 43. **CEPHALANTHUS**, 34. **CEPHALOTAXUS**, **0°**,102,326, **7°**,27, 119,191,211; *uninj.*,

3°,270, **5°**,222, **6°**,47, **10°**,39, **11°**,94, 200,254,299; *Obs.*, sheltered, 280. *CERASUS*, 21; *uningj.*, 299. *CERATONIA*, 207. *CERCIDIPHYLLUM*, 208. *CERCIS* canadensis, 8; *C. siliquastrum* (Judas tree), **-2°**,112, **0°**,37,82, **2°**,216, **3°**,269, **4°**,214, **5°**,29,203,222, **7°**,27, 17,20,106,123,201; *uningj.*, 181,212,213; *Obs.*, 33. *CERCOCARPUS*, *uningj.*, **10°**,19.

CHAMÆBATIA, **1°**,139. *CHAMÆCYPARIS*, glauca, **7°**,27, 97; *C. sphæroidea*, **0°**,326; *uningj.*, **-13°**,295, **3°**,270. *CHAMÆROPS* chinensis, **13°**,178; *C. excelsa*, **0°**?9, **5°**,222,22*,59; *uningj.*, **10°**, 19, **12°**,118, **14°**,191,299, **15°**,184; *C. Fortunei*, **-1°**,30, **0°**?9, **3°**,269, **9°**,212, **12°**,123, **13°**,178, 20,(*m*)51,210,211,223,285; *uningj.*, **4°**,321, **10°**,202,334, **12°**,238, **15°**,200, **16°**,181; *C. humilis*, **10°**,18, **15°**,175; *CHEIRANTHUS*, 28. *CHELONE*, 12. *CHERRY*, **-3°**,25, **-2°**,266, **3°**,226, **4°**,35, **9°**,156, **17°**,52; Morello, **-12°**,131, **-7°**,99, **2°**,141, **5°**,159; *other vars.*, **1°**,219, **5°**,231; (wild), **2°**,101; *uningj.*, **3°**,270, **5°**,203, **9°**,209, **10°**,84, *vars.*, **17°**,52, 80,121,200; Crop, 1880, av., 120,121; good, 41, 48,81,128,302; none, 5,128; graft ineffectual, 26; wood injured, 52; *obs.*, 231. *CHIMONANTHUS fragrans*, (see *CALYCANTHUS*) **-4°**, 278, **0°**?254,274, **1°**,233, **4°**,323, **7°**,27,165, **9°**,212, **10°**,16,18, 57,80,106,176,211,224, (b. z.—**0°**) 1 (1), 4 (3), (**1°**—**10°**), 4 (1), 3 (2), 6 (3); *uningj.*, **-12°**,310, **2°**,284, **3°**,270, **5°**,203, **9°**,209, 108,181,200,238; (**1°**—**10°**) 7, (**11°**—**20°**) 5; *C. virginiana*, 181. *CHOISYA ternata*, **10°**,18, **13°**,178, 211, 223; *uningj.*, **3°**,252, **6°**,5,240, **10°**,202, **12°**,118,238, 63,210,299. *CHRYSANTHEMUM*, 13,15,54, 108; summer flowvars., **2°**,242. *CHRYSOBACTRON*, **8°**, 65.

CINERARIA, 13; *C. acanthifolia*, **12°**,117; *C. argophylla* **15°**,175; *C. maritima*, **12°**,117. *CISSUS*, **10°**,18. *CISTUS albidus*, 56; *C. Algarvensis*, 210; *C. Bertholletianus*, 207; *C. Clusii*, 19; *C. creticus*, 19; *C. crispus*, 210; *C. formosus*, **10°**, 74, 210; *uningj.*, 56; *C. "Gum,"* **-11°**,90, **5°**,80, **12°**,2; *C. incanus*, 210; *C. ladaniferus*, **-4°**,9, **-1°**,45, **0°**,82,221,302, **1°**,31, 287, **3°**,269, **5°**,29, **7°**,27, **10°**,84; *uningj.*, **-1°**,30, **1°**,305, **5°**,222, **7°**,101,125,245, **8°**,65, **10°**,19, 56,200,210,212,238,248. *C. latifolius*, 207; *C. laurifolius*, **0°**?102; *C. lusitanicus*, 210; *C. populifolius*, 19; *C. purpureus*, 56, 210; *C. sp.*, **-13°**,129, **8°**,64, **10°**, 18, 28,63; *C. salviaefolius*, 56; *C. villosus*, 56; *C. sp. uningj.*, **10°**, 19, **15°**,56. *CITRUS*, **0°**,302, **10°**,202, 223.

CLEMATIS, **-12°**,131, **-10°**,113, **-8°**,135, **14°**?189; *C. balearica*,

2; *C. calycina*, **16°**,181; *C. Colensoi*, 334; *C. flammula*, 194; *C. graveolens*, 19; *C. hybs.*, 95; *C. indivisa*, 10; *C. Jackmanni*, **-18°**, 129, **-8°**,300, **-4°**,278, **-1°**,285, **0°**,38,274, **2°**,79,273, **3°**,198, 226,261, **5°**,231, **6°**,199, **9°**,212, 43,194,254; (*b. z.*—**0°**) 4 (1), 12 (2), 4 (3), (**1°**—**10°**) 3 (1), 10 (2), 6 (3), (**11°**—**20°**) 2 (2); *uningj.*, **2°**,216,284, **5°**,137, **9°**,209, **10°**,334, **12°**,238, **15°**,200, 22*,108,210,212,248, (**1°**—**10°**) 8, (**11°**—**20°**) 11; *C. lanuginosa*, **5°**,136, **7°**,12; *C. montana*, **-8°**,300, **-1°**,285, **0°**,83, **1°**,304, **3°**, 241, 34,220,255; *uningj.*, **-13°**,295, **2°**,216, **3°**,270, **5°**,222, 22*, 108,200,210,212,238,248; *C. patens*, **10°**,18; *C. tubulosa*, **10°**, 18; *C. viticella*, **-18°**,129; *C. var.*, Albert Victor, **0°**,38; *Obs.*, tribes, 137. *Clerodendron*, **10°**,18, **16°**,63. *Clethra*, *alnifolia*, 181; *C. arborea*, **15°**,10. *CLEYERA*, 256; *uningj.*, **10°**,19. *CLIANTHUS*, **-13°**,294, **-2°**,266, **0°**,274,326, **3°**,198, **4°**,321, **12°**,117,123, 10 (*bis*), 22*,58,175,254,299.

COCCOLOBA, 149. *COCCULUS*, 334. *COLLETIA* *Bictoniensis*, **8°**,64, **13°**,22, **15°**,54, **16°**,63, 22*; *C. cruciata*, **3°**,241, **4°**, 217, **10°**?,2, **15°**,175, 194,211,223; *uningj.*, **10°**,19; *C. ferrox*, **-1°**,30, **3°**,241, **5°**,222, **7°**,27,211,223,254; *uningj.*, **3°**, 270, **4°**,217, **10°**,202, 22*; *C. horrida*, **10°**,318; *uningj.*, **10°**,19, 51; *C. serratifolia*, 208; *C. spinosa*, **10°**, 318,34. *COLUTEA*, **16°**,63; *uningj.*, **-13°**,295, 22*,212. *COMMELYNIA*, **16°**,63,181. *COMPTONIA*, 212. *CONIFERS* **-1°**,30, **0°**,228, **12°**, 58, **15°**,15,68, 150,246; *uningj.*, **0°**,156, **5°** (*esp. Jap.*), 137, **8°**,179, **12°**,58,121, 68,69,80,97,109,111,121,125,157,159,190,191. *CONVOLVULUS* *althæoides*, 220; *uningj.*, **10°**,19; *C. cantabricus*; *uningj.*, **10°**,19; *C. Cneorum*, **8°**,64, 211; *C. sericeus*, 10. *COPROSMA*, 20. *CORBULARIA*, **8°**,63. *CORCHORUS*, 108. *CORDIA*, 211. *CORDYLINE* *australis*, **1°**,139, **16°**,187, 149; *uningj.*, **18°**,183, **20°**,120; *C. Banksii*, **13°**,178; *C. gracilis*, **16°**,187; *C. indivisa*, **13°**,178, **15°**,183, **31°**,149; *C. Veitchii*, **31°**,149. *CORIARIA*, **-1°**,30, **10°**,18. *CORNUS* (*CORNEL*), **10°**,145; *uningj.*, **-6°**,89,108,181. *CORONILLA* *Emerus*, 181; *C. glauca*, **-9°**,232, **0°**,274,302, **3°**,198,241, **9°**,265, **12°**,117,123, 215,327; *uningj.*, **9°**,209, **15°**,53,200, 8,22*. *CORTUSA*, 10. *CORYPHA*, *uningj.*, 53,63. *COTONEASTER* *acuminata*, **0°**?,102; *C. affinis*, 181; *C. buxifolia*, **-4°**,167; *C. congesta*, 19; *C. frigida*, 181; *C. japonica*, **-2°**,103; *C. microphylla*, **-11°**,90, **-8°**,135, **-6°**,89,329, **-4°**,(*m*)167, **-2°**,112,266, **0°**,135,221, **5°**, 222, **9°**,265, 1871,90 (*b. z.*—**0°**) 13 (1), 13 (2), 4 (3), (**1°**—

10°), 8 (1), 6 (2), 6 (3), (**11°—20°**) 3 (1), 5 (2), 11 (3); *uninj.*, **2°**,216,284, **3°**,270, **5°**,203, **7°**,245, **9°**,209, 22*,171,181, 200,212,238, (b. z.—**0°**) 4, (**1°—10°**) 11, (**11°—20°**)9; *C. rotundifolia*, **-1°**,45; *C. Sieboldii*, &c., 108; *C. Simonsii*, **-11°**, 90, **-6°**,329, **-1°**,285, **0°**?102, **4°**,35, **5°**,204, **9°**,265, **10°**,39, 84, (b. z.—**0°**) 6 (2), 3 (3), (**11°—20°**) 1 (1), 7 (3), 8 (3); *uninj.*, **2°**,216,284, **3°**,270, **4°**,215, **5°**,203, **10°**,19, 22*,212,238, 254,285, (b. z.—**0°**) 3, (**1°—10°**) 10, (**11°—20°**) 9.

CRATÆGUS, "Evergreen Thorn," **-18°**,129; *C. oxyacantha*, fl. pl., **-13°**,129, **1°**,219; (b. z.—**0°**) 2 (1), 4 (2), 1 (3), (**1°—10°**) 3 (3); *uninj.*, **-2°**,316, **3°**,270, **5°**,203,222, (b. z.—**0°**) 2 (1), (**1°—10°**) 10; *Obs.*, 232; *C. Pyracantha*, **-13°**,129, **-11°**,90, **-7°**,142, **-5°**,110, *var. cuneata*, **-2°**,112, **-1°**,285, **1°**,219,304, **2°**,216, **4°**, 127, **5°**,227, (b. z.—**0°**) 4 (1), 4 (2), 4 (3), (**1°—10°**) 0 (1), 4 (2), 6 (3); *uninj.*, **-2°**,316, **2°**,284, **3°**,270, **4°**,215, **5°**,203,222, (b. z.—**0°**) 3, (**1°—10°**) 10, (**11°—20°**) 6; *C. vars.*, **-11°**,134; *uninj.*, 181. *CROCOSMIA*, 19. *CRINUM*, *uninj.*, 248, 334. *CRYPTOME-RIA elegans*, **-7°**,99, **-5°**,110, **-4°**,98, **-2°**,266, **-1°**,285, **0°**,38,135, 228,274, **1°**,219, **2°**,216,284, **3°**,198, **4°**,198,214, **6°**,47,199, **10°**, 36, (b. z.—**0°**) 4 (1), 9 (2), 7 (3), (**1°—10°**) 1 (1), 5 (2), 15 (3); *uninj.*, **-6°**,89, **0°**,156, **3°**,270, **9°**,213, 20,121,200,238,254,299; *C. japonica*, **-6°**,89, **-4°**,278, **-3°**,87, **0°**,135,228,274, **2°**,101,216, **3°**,166,198,226, **4°**,127,214, **6°**,199, 102,191,211, (b. z.—**0°**) 2 (2), 11 (3), (**1°—10°**) 3 (1), 3 (2), 12 (3); *uninj.*, **0°**,156,249, **1°**,233, **2°**,284, **3°**,270, **5°**,222, **7°**,125, **10°**,39, 69,200,210,238, 254, (b. z.—**0°**) 6 (1), (**1°—10°**) 10, (**11°—20°**) 5; *C. j. var. Lobbii*, **3°**,166, 97,191.

CUNNINGHAMIA, **-2°**,301, **10°**,18, 211; *uninj.*, 149,299. *CUPRES-SUS borealis*, **0°**,302; *uninj.*, **-13°**,295, **-10°**,290, **2°**,284, **3°**,270, **4°**,215, 238,299; *C. Corneyana*, **1°**,31, 97; *C. excelsa*, **-1°**,30; *C. fragrans*, **-1°**,30; *C. funebris*, **-1°**,30, 299; *C. Goveniana*, and *vars.*, **1°**,31, **7°**,27, **10°**,48; *uninj.*, 254; *C. Knightiana*, **1°**,31, **3°**,241, 54; *C. Lambertiana*, **-2°**,315, **-1°**,285, **1°**,5,106, **4°**, 214, **6°**,303, 254; *uninj.*, **3°**,270, **7°**,125, 238,299; *C. Law-soniana*, **-12°**,142, **-11°**,134, **-6°**,89, **-5°**,110, **-1°**,30, **0°**,250, *vars.*, **1°**,31, **4°**,73, **5°**,204, **6°**,47,240, **7°**,227, **8°**,113, **10°**,36,84, *vars.*, 22, 201, (b. z.—**0°**) 4 (1), 2 (2), 1 (3), (**1°—10°**) 2 (1), 2 (2), 10 (3); *uninj.*, **-13°**,295, **-7°**,290, **0°**,156, and *vars.*, 249, **2°**,284, **3°**,72, 270, **4°**,215, **5°**,203,222, **7°**,125, **8°**,151, **9°**,209,213, **10°**,39,

22*, vars., 69,109,111,200,210,254,299; *uninj.*, (b. z.—0°) 8, (1°—10°) 20, (11°—20°) 8; *C. macrocarpa*, -11°,90, -7°,99, -6°,89, -4°,278, -1°,30,285, 0°,37,221, 1°,31,139, 2°,31, 5°,29, 6°,47,205,303, 7°,27, 9°,228, (b. z.—0°) 7 (1), 2 (3), (1°—10°) 7 (1), 6 (5), 5 (3); *uninj.*, 2°,284, 3°,72,270, 4°,215,238, 17,109, 200,299, (1—10°) 8, (11°—20°) 7; *C. Nutkaensis* (see *THUJOPSIS borealis*); *C. sempervirens*, -1°,30, 0°,302, 1°,233, 2°,284, 3°,198, 300, 5°,222, 6°,303, 7°,27; vars., 10°,48; *uninj.*, 0°,156, 3°,270, 9°,209, 200,238,299, (1°—10°) 6, (11°—20°) 5; *C. thurifera*, 253; *C. torulosa*, 0°,274, 2°,322, 3°,166, 5°,318, 10°,318, 176,223,237,254; *C. Woolgariana*, 253. CURRANT, crop, (1880), av. or fair, 121,164,168; def. (black only), 79,128; good, 9,13,35, 41,46,48,70,106,138,158,160,164,166,189, -10°,113; *uninj.*, -12°,310, -9°,232, 8°,113, (b. z.—0°) 5, (1°—10°) 13, (11°—20°) 8.

CYATHEA, 149. CYCLAMEN, 2°,242, 4°,35, 53,108. CYDONIA japonica, 0°?,102; *C. sorts*, -13°,294; *uninj.*, 181; *C. vulgaris* (see QUINCE). CYNARA, 1° (*m. Synara*), 140. CYPELLA, 7°,(*m*)12. CYPRIPIEDUM, 210. CYTISUS albus (see GENISTA alba), 3°,166, vars., 4°,73, 9°,79, 10°,84; *C. bracteatus*, 13°,178; *C. carolina*, 9°,291; *C. Laburnum*, -18°,129, -12°,131, -11°,134, golden, 6°,47, 7°,59; *uninj.*, -9°,232, (b. z.—0°) 4, (1°—10°) 13, (11°—20°) 11; *Obs.*, exposed, -18°,129,130; great inj., 7; much blossom, 139; young trees, 7; *C. purpureus*, -18°,130; *Obs.*, wet, 78; *C. ramosus*, 12°,123; *C. scoparius* (BROOM), -10°,113, -5°,110,328, -4°,98, 2°,164, 5°,136, 10°,7,84, (b. z.—0°) 5 (1), 4 (2), 2 (3), (1°—10°) 3 (1), 3 (2), 1 (3); *uninj.*, 3°,270, 5°,222, 7°,245, 212, (1°—10°) 6, 11°—20°) 6; *Obs.*, -5°,110; *C. tomentosus*, 13°,178.

DACRYDIUM cupressinum, -13°,294; *D. Franklinii*, 1°,139; *uninj.*, 208; *D. sp.*, 2°,31. DAHLIA glabrata, 16°,63; *D. variabilis*, 3°,198, 7°,13, 46,176,223,299; *uninj.*, 2°,284, 7°,13, 9°,6,334, 183. DAISY (see BELLIS). DAPHNE Blagayana, (*m*) 181; *D. Cneorum*, -5°,8,89, 0°?,102, 207; *D. collina*, 0°,302, 1°,304, 2°,242, 4°,198, 10°,18; *uninj.*, -13°,295, 3°,270, 7°,125, 22*,212; *D. Fioniana*, 299; *D. indica*, 0°,302, 63,223; *uninj.*, 2°,284, 3°,270, 10,22*,212; *D. Laureola*, -7°,99, 9°,213, 13°,60; *uninj.*, -9°,232, -2°,316, 1°,233, 2°,217, 3°,270, 22*,209, (1°—10°) 9; *D. Mazelii*, 207; *D. Mezereum*, -4°,98, -1°,285, 0°?,254, 8°,156, 9°,95,156; *uninj.*, -12°,310, -9°,232, -2°,316, 1°,233, 2°,217, 3°,270, 22*,209,212,

(1°—10°) 9, (11°—20°) 7; *D. oleifolia*, 211; *D. oleoides*, 19; *D. pontica*, 5°, 136; *D. salicifolia* (*caucasica*), 19; *D. Van Houttei*, 207. *DASYLIRION*, 63.

DECIDUOUS trees, 5°, 29, 8°, 86, 15° 15; *uningj.*, 8°, 86, 15°, 68, 14, 44, 111; *Obs.*, foliage abundant, 69; low situation, 74; timber, 70; wet, -11°, 134, 5°, 29, 17°, 11; winds, 15°, 15, 17°, 11; wood unripened, 7°, 123; do. well ripened, 216. *DEERINGIA*, 63. *DELPHINIUM*, 19. *DESFONTAINEA*, -13°, 129, -2°, 112, 301, 2°, 164, 216, 9°, 213, 21, 56, 94, 108, 119, 200, 201, 211, 223, (b. z.—0°) 4 (1), (1°—10°) 4 (1), 2 (2), 1 (3), (11°—20°) 4 (1), 2 (2), 4 (3); *uningj.*, 10°, 19, 202, 12°, 118, 238, (1°—10°) 3, (11°—20°) 15. *DESMODIUM*, 207; *uningj.*, 6°, 303, 10°, 202, 16°, 181. *DEUTZIA canadensis*, 181; *D. candidissima*, 181; *D. crenata*, 181; *D. Fortunei*, 181; *D. gracilis*, -4°, 98, 5°, 136, 9°, 213, 102; *uningj.*, 16°, 181; *D. rosea*, 60; *D. scabra*, -18°, 130, -6°, 329, -1°, 285, 0°, 274, 1°, 304, 2°, 322, 5°, 203, 6°, 303, (1°—10°) 2 (2), 10 (3); *uningj.*, -2°, 316, 1°, 233, 2°, 217, 284, 3°, 270, 4°, 215, 5°, 222, 9°, 213 333, 22*, 108, 181, 210, 212, (1°—10°) 11, (11°—20°) 7; *D. stamina*, 181.

DIANTHUS (see *CARNATION*). *DICKSONIA antarctica*, 149; *D. squarrosa*, 149. *DICTAMNUS*, 220. *DIETES*, 64. *DIMORPHANTHUS* (see *ARALIA*). *DIONÆA*, 334. *DIOSPYROS Kaki*, 10°, 18; *D. Lotus*, *D. Mazelli* and *D. virginicus*, -13°, 294. *DIOTIS*, 10. *DIPLACUS*, 63. *DIPLOPAPPUS*, 64. *DISCARIA longispina*, 207; *D. Toumatou*, 208.

DODONÆA, 120.

DRACÆNA, -2°, 266, 301, -1°, 30, 0°, 274, 3°, 198, 241, 5°, 222, 6°, 240, 10°, 202, 200, 223, 237, 239, 254, (b. z.—0°) 2 (1), 1 (2), (1°—10°) 5 (1), 5 (2), (11°—20°) 4 (2), 1 (3); *uningj.*, 31°, 51. *DRACOCEPHALUM*, 181. *DRIMYS*, 63, 178. *DROSERA*, 334.

DUVAUA, -1°, (*m*) 30, 211.

ECHEVERIA metallica, -4°, 278, -2°, 266, -1°, 285, 0°, 274, 302, (1°—10°) 11 (1); *E. secunda*, 10; *uningj.*, 7°, 13, 108. *ECREMOCARPUS*, 222.

EDWARDSIA grandiflora, 8°, 64, 10°, 18; *uningj.*, 8°, 65, 10°, 202, 149; *E. MacNabiana*, 211; *E. microphylla*, 1°, 139, 8°, 64, 63, 178, 194, 207; *uningj.*, 2. *ELÆAGNUS angustifolia*, 181; *E. argentea*, 6°, 47, 10°, 74, 202, 50; *uningj.*, 3°, 270, 22*, 200, 299; *E. japonica*, 149; *E. longipes*, 22; *uningj.*, -13°, 295; *E. pungens*,

50,194,223; *uningj.*, 299; *E. reflexa*, **-13°**,294, 21,136; *E. vars.*, *uningj.*, **4°**,217, 9.

ELDER, vars., **-18°**,130, 59. ELM, **-8°**,135, **-7°**,99, **2°**,101, 15; *uningj.*, 22*,212,222,245; *Obs.*, exposed and sheltered, **-7°**,99. ELSHOLTZIA 207.

EMBOTHRIUM, 50,175,202,207,223,237; *uningj.*, 51,181.

ENDIVE (b. z.—**0°**), 13 (1), 3 (2), (**1°—10°**) 21 (1), 5 (2), (**11°—20°**) 5 (1), 1 (2). Enkianthus, **10°**,19, (*m*) 208, 212.

EPHEDRA distachya, **-1°**,30; *E. lomatolepis* and *E. monostachya*, 19. EPIMEDIUM, **2°**,242.

EREMURUS, 12. ERCILLA (*see* BRIDGESIA). ERICA alba, 190; *E. arborea*, **1°**,139, **13°**,178; *E. australis*, 190; *E. carnea*, **3°**,198; *uningj.*, 299; var., 334; *E. ciliaris*, 334; *E. codonodes*, **1°**,139, 207; *uningj.*, 21,238; *E. herbacea*, **5°**,318; *uningj.*, **-12°**,310; *E. Mawiana*, 334; *E. mediterranea*, **1°**,139, **3°**, (stems split) 269, **5°**,318, 54,187,207, (b. z.—**0°**) 1 (1), 5 (2), 2 (3), (**1°—10°**) 4 (1), 10 (2), 3 (3), (**11°—20°**) 4 (1), 2 (2), 2 (3); *E. multiflora*, 207; *E. scoparia*, 207; *E. vulgaris*, vars., 334; *E. sp.*, **-13°**,294, **-6°**,329, **3°**,160, **4°**,198,214, 73,109. ERIOBOTRYA, **-13°**,294, **-1°**, (*m*) 30, **1°**,287, **10°**,18,60,117,211,223,299; *uningj.*, **2°**,284, **3°**,270, 22*. ERODIUM, 28. ERYNGIUM bromeliæfolium, **8°**,64; *E. eburneum*, 10; *E. Lasseauxii*, **10°**,(*m*)18; *E. pandanifolium*, **0°**,82, **8°**,64, 299; *uningj.*, 120; *E. sp.*, 2. ERYTHRINA, 11,58. ERYTHROCHÆTE, **10°**, (*m*) 19.

ESCALLONIA Balfourii, 187; *E. coquimbensis*, 211; *E. grandiflora*, 10; *E. illinita*, **10°**,18, 22; *E. Ingrami*, **-13°**,294, **-11°**,90, **3°**,166,269, **5°**,222, **6°**,199, 22*,34,60,223, (b. z.—**0°**) 2 (1), 2 (2), (**1°—10°**) 5 (1), 6 (2), 1 (3); *uningj.*, 181,299; *E. macrantha*, **-18°**,130, **-13°**,129, **-11°**,90,134, **-8°**,135, **-7°**,142, **-6°**,89, **-4°**, 98, **-2°**,266, **-1°**,5,141, **0°**,81,82,156, (b. z.—**0°**) 11 (1), 12 (2), 1 (3), (**1°—10°**) 20 (1), 25 (2), 8 (3), (**11°—20°**) 5 (1), 8 (2), 6 (3); *uningj.*, (b. z.—**0°**) 0, (**1°—10°**) 3, (**11°—20°**) 11; *E. macrophylla*, **2°**,179, 34; *E. montevidensis*, **-13°**,294, **2°**,216, **10°**, 74, 8,10,22,22*,50,53,202; *uningj.*, **3°**,270, 22; *E. Organensis*, **10°**,18; *E. Philippiana*, 212; *E. pterocladon*, (*m*)148,318; *E. pulverulenta*, 10; *E. rubra*, **-13°**,294, **-8°**,300, **0°**,302, **3°**,166, **4°**, 321 (bis), **5°**,222, **6°**,199,303, **7°**,27,125, 2,117,178,194,201,223, 299,304; *uningj.*, **3°**,270, 181,200; *E. serrata*, 181; *E. sp.*, 11, 53. ESCHSCHOLTZIA, 54.

EUCALYPTUS *coccifera*, 208,223,299; *E. coriaceus*, 120; *E. globulus* (b. z.—0°) 6 (1), 1 (2), (1°—10°) 30 (1), 1 (2), (11°—20°) 18 (1), 3 (2); *uninj.*, 31°,51, 189; *Obs.*, sheltered, 213; *E. Gunnii*, 207; *uninj.*, 120; *E. resiniferus*, 10. *EUCOMIS*, 65. *EUGENIA* *apiculata*, -13°,294, 10°,148, 22,63,106; *uninj.*, 10°,202, 120; *E. Ugni* (b. z.—0°) 2 (1), 1 (3), (1°—10°) 6 (1), 2 (2), 1 (3), (11°—20°) 3 (1), 2 (2), 1 (3); *uninj.*, 22†,118,200. *EULALIA*, 10°,18; *uninj.*, 3°,252, 22,51,63,210. *EUONYMUS* *atropurpureus*, 181; *E. fimbriatus*, 10°,18, 63; *E. europæus*, (b. z.—0°) 1 (1), 2 (2), (1°—10°) 2 (1), 3 (2), 2 (3); *uninj.*, -9°,232, -2°,316, (b. z.—0°) 2, (1°—10°) 7, (11°—20°) 4; *E. japonicus*, (b. z.—0°) 8 (1), 9 (2), 1 (3), (1°—10°) 23 (1), 16 (2), 3 (3), (11°—20°) 8 (1), 14 (2), 5 (3), (21°—32°) 2 (1), 2 (2), 2 (3); *uninj.*, 10°,7,48, 109,118,181,256, (11°—20°) 6; *E. jap.*, vars., (b. z.—0°) 2 (1), (1°—10°) 7 (1), 8 (2), 7 (3), (11°—20°) 1 (1), 1 (2), 1 (3); *Obs.*, wet, 117; *E. pungens*, 207; *E. radicans*, -2°,266,301, 0°,82,135,302, 1°,304, 2°,164,216, 3°,198,241, 269, 4°,214, 6°,47,240,303, 9°,213, 10°,18; *Do. varieg.*, 5°,98, 34, (b. z.—0°) 5 (2), 1 (3), (1°—10°) 5 (1), 9 (2), 10 (3); *uninj.*, -13°,295, 9°,209, 200,222,248,299,334, (1°—10°) 4; *E. tinogens*, 10°,18. *EUPATORIUM*, 16°,181. *EUPHORBIA*, 64,65. *EURYA*, 5°,136, 10°,18, 50; *uninj.*, 118. *EURYBIA* *argophylla*, 4°,321, 323, 106; *E. Gunniana*, 1°,139, 10°,318; *uninj.*, 10°,19, 16°,181; *E. ilicifolia*, 1°,139, 4°,321,323, 10°,18,318, 54,211; *uninj.*, 21, 22†,181; *E. latifolia*, 4°,323; *E. tomentosa*, -13°,294; *E. Tra-versii*, 1°,139. *EVERGREENS*, various, *Obs.*, -4°,278, 0°,274, 1°-9,273; lost foliage, 26,101,216,258,263,279; sheltered, 99,154; wet, effects of, 11,84,85,111,134,140; wood, well ripened, 308,312.

EXOCHORDA, 10°-5,60, 28; *uninj.*, 5°,203.

FABIANA, -13°,294, 0°,274, 8°,64, 22*,51,64,106,175,207,211, 223; *uninj.*, 10°,19, 51,109,120,181,183,334. *FAGUS* (see *BEECH*). *FARFUGIUM*, 117,181. *FATSIA japonica* (see *ARALIA Sieboldii*); *F. papyrifera* [jap., ?] 51.

FESTUCA, 19.

FIG, (b. z.—0°) 4 (1), 6 (2), (1°—10°) 10 (1), 13 (2), 1 (3), (11°—20°) 5 (2), 1 (3); *uninj.*, (1°—10°) 3, (11°—20°) 4; *vars. kd.*, 179. *FITZROYA*, -13°,294, 0°,324, 1°,31,139, 3°,166, 119,237,246; *uninj.*, 2°,284, 4°,217, 10°,19, 22†,212.

FONTAINESIA, 10°, 18, 207. FORSYTHIA Fortunei, *uninj.*, 10°, 19; F. elegans, -13°, 294, -10°, 304, -4°, 278, 2°, 216, 4°, 127, 5°, 204; *uninj.*, 2°, 284, 3°, 270, 4°, 215, 217, 22†, 212, 238; F. suspensa, -13°, 294; *uninj.*, 10°, 19, 16°, 181; F. viridissima, -13°, 294, -2°, 301, -1°, 72, 285, 1°, 287, 3°, 226, 5°, 203, 204, 9°, 213, 228, 187; *uninj.*, 1°, 233, 2°, 284, 3°, 270, 4°, 215, 7°, 245, 22†, 118, 181, 200, 212. FOURCROYA, 51, 237.

FRAGRARIA indica, *uninj.*, 10°, 19, 183. FRANCOA, 8°, 64, 176. FRAXINELLA, 5°, 80. FRAXINUS excelsior (see ASH); F. mandshuriensis and F. Ornus, 285; F. xanthoxyloides, 6°, 47.

FREESIA, 10. FREMONTIA, -13°, 294, 12, 22; *uninj.*, 10, 19, 118, 120, 202, 270.

FRITILLARIA Forbesii, 65; F. recurva, 10. FRUIT Trees, *Obs.*, 46, 51, 55; canker, 93; crops (1880), deficient, 6, 9, 70, 86, 88, 130, 138, 141, 150, 156, 158; good, 13, 14, 74, vars., 111, 120; none, 6, 15, 114, 121, 138; crops (1881), good, 197, 272, 301, 307, 325; Flowering, late, 216, 325; Frost, effects of, 6, 34, 41, 86, 111, 114; Pith, browned, 26; Roots, slow action of, 46, 47; Slight inj. or uninjured, 55, 74, 84, 138, 252; Wet, injury by, 86, 131, 150, 151, 164; Winds, effects of, 5, 11, 15, 16; Wood, unripened, 6, 13, 35, 55, 84, 130, 131, 148, 166; Wood, well-ripened, 310, 312, 322, 323, 325, 329.

FUCHSIA alpestris, 63; F. carolina, 200; F. coccinea, (1°—10°) 2 (1), 6 (2), 2 (3), (11°—20°) 1 (1), 42 (2); *uninj.*, 3°, (m) 270, 4°, 217, 8°, 65, (1°—10°) 6, (11°—20°) 3; F. conica, 63; F. corallina, *uninj.*, 10°, 19, 200; F. coronata, 60; F. discolor, 14°, 299; *uninj.*, 10°, 19; F. excorticata, 14°, 299; *uninj.*, 10°, 19, F. gracilis, -1°, 30, 3°, 241, 5°, 222, 54, 60, 211, 298; *uninj.*, 3°, 270, 5°, 203, 10°, 19, 108, 200, 299, (1°—10°) 5, (11°—20°) 4; F. lycioides, 63; F. macrostemma, *uninj.*, 3°, 270, 16°, 63; F. "Madame Cornelissen," (m) 299; F. minima, *uninj.*, 183, 334; F. procumbens, &c., 64; *uninj.*, 183; F. pumila, 19; F. radicans, 14°, 299; F. Riccartoni, (b. z.—0°) 10 (1), 8 (2), 2 (3), (1°—10°) 14 (1), 16 (2), 9 (3), (11°—20°) 2 (1), 1 (2); *uninj.*, (1°—10°) 5, (11°—20°) 4; F. sanguinea, 334; F. Thompsonii, *uninj.*, 10°, 19, 211; F. variegata, 211; F. [m. ?] virginata, 19. FURZE (ULEX europæa), (b. z.—0°) 10 (1), 8 (2), 2 (3), (1°—10°) 14 (1), 16 (2), 9 (3), (11°—20°) 9 (1), 2 (2), 1 (3); F. fl. pl., (b. z.—0°) 5 (1), 1 (2), (1°—10°) 5 (1), 13 (2), (11°—20°) 2 (1), 1 (2); *Obs.*, 15; wet, 125.

GAILLARDIA, 28. GALAX, 2°, 242. GARRYA (b. z.—0°) 14 (1), 9 (2), 3 (3), (1°—10°) 10 (1), 27 (2), 11 (3), (11°—20°) 1 (1), 4 (2), 3 (3); *uninj.*, (b. z.—0°) 2, (1°—10°) 3, (11°—20°) 6. GAULTHERIA nummularia, 207; *G. procumbens*, 108, 181; *G. Shal-lon*, -7°, 142, 7°, 27. GAURA, 220.

GENISTA alba (*see* CYTISUS albus) 17, 22; *G. cinerea*, 0°? 102, 13°, 178; *G. laburnoides*, 13°, 178; *G. monosperma*, 207; *G. præcox*, 13°, 178; *uninj.*, 16°, 181; *G. racemosa*, 3°, 241; *uninj.*, 2°, 284, 3°, 270; *G. sagittalis*, 181. GENTIANA, 7, 242. GEUM, 5°, 159, 8° (*m* "Greens") 113. GILLENIA, 28.

GLADIOLUS, -10°, 304, -1° 5, 141, 3°, 198, 5°, 225, 8°, (vars., 64, 10°, 16, 12°, 191; *uninj.*, 2°, 284, 3°, 270, 5°, 222, 22†, 65, 200, 299. GLEDITSCHIA horrida, 1°, 304, 4°, 321, 7°, 27; *uninj.*, 5°, 222, 22†, 212; *G. inermis*, 7°, 27; *uninj.*, 5°, 222, 22†; *G. triacanthos*, 7°, 125, 21, 254; *uninj.*, 5°, 222, 182. GLYPTOSTROBUS, 10°, 18.

GOOSEBERRY, 0°, 228, 2°, 216, 4°, 198, 10°, 84; *uninj.*, -12°, 310, -2°, 316, 3°, 270, 8°, 113; Crop (1880), av. or fair, 138, 168; good, 9, 13, 35, 41, 46, 48, 70, 79, 106, 121, 128, 158, 160, 164, 166, 189. GORDONIA, 10°, 18, 212.

GRABOWSKIA, 207. GREVILLEA, 4°, 321, 13°, 178, 223, (1°—10°), 2 (1), 1 (2), 1 (3). GRISELINIA, -13°, 294, 0°, 221, 1°, 304, 2°, 216, 4°, 321, 5°, 29, 203, 10°, 18, (b. z.—0°) 1 (1), (1°—10°) 6 (1), 5 (2), 4 (3); *uninj.*, 7°, 125, 10°, 19, 299; *G. macrophylla*, 149.

GUNNERA manicata, 10°, 18, (*m*) 256; *G. scabra*, 3°, 241, 5°, 222, 119, 181, 237, 239, (b. z.—0°) 1 (1), (1°—10°) 1 (1), 1 (2), 3 (3), (11°—20°) 1 (1), 3 (2); *uninj.*, 22†, 210, 212, 299.

GYNERIUM argenteum (*see* PAMPAS Grass); *G. jubatum*, 10°, 18.

HABRANTHUS, 10, 64. HABROTHAMNUS, 3°, 252, 10°, 202, 176, 211, 223, 321, 327; *uninj.*, 10, 58. HAMAMELIS, 19. HALESIA dip-tera, -13°, 294; *uninj.*, 182; *H. tetraptera*, -13°, 294, 3°, 244, 106; *uninj.*, 3°, 270, 5°, 203, 10°, 48, 22†, 233. HARTOGIA, 5°, 136, 10°, 318.

HEARTSEASE, 108. HEDERA (*see* IVY); *H. algeriensis*, 148, 207; *canariensis*, 5°, 136; *H. Helix*; *H. himalaica*, 207; *H. maculata*, 207; *H. minor*, 207; *H. Rœgneriana*, 5°, (*m*) 136, 203; *H. rhom-bea*, 207. HEDYCHium, 8°, 64; *H. coronarium*, 210; *H. flavum*, 51; *H. Gardnerianum*, 63. HELIANTHEMUM halimifolium, 207; *H. roseum*, -10°, 113; *H. sp.*, 63. HELIANTHUS, 182. HELWIN-

GIA ruscifolia, $10^{\circ}, 18, (m) 211$. HERBACEOUS plants, various, 65; bloom in 1880, 7; bulbous, 37, 65, 86; fine, 281; snow, protected by, 164; *uningj.*, 69, 141, 145, 164, 281; frost or wet, effects of, 12, 38, 46, 86, 142. *HESPERIS*, $2^{\circ}, 242$.

HIBISCUS grandiflorus, 63; *H. syriacus*, $-13^{\circ}, 294$, $-2^{\circ}, 301$, 0° , 221, $6^{\circ}, 303$, 97, 109, 123; *uningj.*, $2^{\circ}, 284$, $3^{\circ}, 270$, 7, 22†, 299. *HIPPOPHAE*, $7^{\circ}, 27$; *uningj.*, $10^{\circ}, 39$.

HOLBÖLLIA, $3^{\circ}, 241, (m) 208$. HOLLY, (b. z.— 0°) 11 (1), 31 (2), 12 (3), (1° — 10°) 6 (1), 27 (2), 16 (3); *uningj.*, (b. z.— 0°) 9, (1° — 10°) 12, (11° — 20°) 8; *Obs.*, dry situation, $0^{\circ}, 92$; exposed, $-3^{\circ}, 25, 99, 112$; fruit of, 155, 160; individuals inj., $-4^{\circ}, 5, 85$, 9° , 77; lost foliage, 26; sheltered, $-7^{\circ}, 99$, $-3^{\circ}, 88$, $9^{\circ}, 266$, 77, 86, 131; thickly planted, $2^{\circ}, 79$; vars., $-10^{\circ}, 78$, $-5^{\circ}, 110$, $4^{\circ}, 73, 263$; wet, 88; wind, 25, 273; *H. variegata*, (b. z.— 0°) 5 (1), 14 (2), 4 (3), (1° — 10°) 6 (1), 9 (2), 16 (3); *uningj.*, (b. z.— 0°) 4, (1° — 10°) 5, (11° — 20°) 5. HOLLYHOCK, 46, 191. HONEYSUCKLE, (*LONICERA Periclymenum*) $-13^{\circ}, 295$, $-10^{\circ}, 113$, $-7^{\circ}, 99$, $-1^{\circ}, 285$, $0^{\circ}, 83$, 43; *uningj.*, $4^{\circ}, 215$, $5^{\circ}, 203$, 22†, 212. HOREHOUND, $-7^{\circ}, 99$. HOUSE-LEEK (*SEMPERVIVUM*), $6^{\circ}, 329$.

HYACINTHUS candicans, $8^{\circ}, 64$, $16^{\circ}, 63$ [*m* ?] *candidus*, 220; *uningj.*, 19; *H. sp.*, 37, 86; *uningj.*, $-12^{\circ}, 310$, $-9^{\circ}, 232$, $-2^{\circ}, 316$, $3^{\circ}, 270$, 4° , 215, 22†, 200, 209, 238, 248, 299, 334. *HYDRANGEA arborescens*, -13° , 294, $-10^{\circ}, 304$, $-2^{\circ}, 301$, $3^{\circ}, 198, 252, 269$, $6^{\circ}, 303$, 22*; *uningj.*, -1° , 30, $5^{\circ}, 222$; *H. grandiflora*, 182; *H. Hortensia* (*hortensis*), “*Hydrangeas*,” (b. z.— 0°) 2 (1), 4 (2), (1° — 10°) 7 (1), 4 (2), 5 (3), (11° — 20°), 3 (1), 4 (2), 2 (3); *uningj.*, (1° — 10°) 3, (11° — 20°) 2; *H. japonica*, $-13^{\circ}, 294$, $-1^{\circ}, 285$, $0^{\circ}, 274$, $1^{\circ}, 139$, $3^{\circ}, 198$, 252, $6^{\circ}, 303$, $8^{\circ}, 124, 227$, $10^{\circ}, 185$, 22*, 55, 200; *uningj.*, $3^{\circ}, 270$, 248; *H. nivea*, $10^{\circ}, 18$; *uningj.*, $16^{\circ}, 182$; *H. Otaksa*, $-13^{\circ}, 294$, $3^{\circ}, 198$, $10^{\circ}, 18$, 22*, 50; *H. paniculata*, 246; *H. quercifolia*, $10^{\circ}, 18$; *uningj.*, $-1^{\circ}, 30$. *HYMENANTHERA*, $3^{\circ}, 252$; *uningj.*, 63. *HYPERICUM balearicum*, $3^{\circ}, 198, 252$, $16^{\circ}, 63$; *uningj.*, $-2^{\circ}, 316$, $2^{\circ}, 284$, $3^{\circ}, 270$, 22†; *H. Calycinum*, (b. z.— 0°) 6 (2), 1 (3), (1° — 10°) 8 (2), 9 (3); *uningj.*, $-2^{\circ}, 316$, $3^{\circ}, 270$, $4^{\circ}, 215$, 22†, 245, 248; *Obs.*, dry, 27; wet, 27; *H. canariense*, 10; *H. Kalmianum*, 182; *H. nepalense*, 5° , 29, $10^{\circ}, 148$; *H. oblongifolium*, $12^{\circ}, 2, 178$, $15^{\circ}, 56$, $16^{\circ}, 187$; *H. patulum*, $13^{\circ}, 178$; *H. punctatum*, 182; *H. quadrangulare*, 182; *H. shrubby*, sp., 2; *H. Wallichianum*, 241. *HYSSOPUS*, 19.

IBERIS *coriifolia*, **2°**, (*m*) 242; *I. gibraltarica*, **1°**, 139, (*m*) 194, 220; *uninj.*, 51; *I. sempervirens*, **1°**, 139, 108; *I. Tenoreana*, 194.

IDESIA, **10°**, 18, 211, 246; *uninj.*, 182, 208.

ILEX, **0°**, 36; *I. Azevinho*, *Lowe* (*canariensis*, *Poiret*) 207; *I. balearica*, 256; *I. cassine*, 207; *I. cornuta*, 176, 207; *uninj.*, **10°**, 19; *I. crenata* and *vars.*, 208; *I. diphyrena*, **10°**, 139, 207, 211; *I. elliptica*, 211; *I. furcata*, 178; *I. japonica*, **9°**, 213; *I. latifolia*, 21; (*m*) *I. maderensis*, 256; *I. opaca*, 208; *I. Perado*, **-1°**, 30. **ILICUM**, 182; *I. anisatum*, 207; *I. floridanum*, **10°**, 18, (*m*) 207, 211; *I. religiosum*, (*m*) 207, 299; *uninj.*, 212.

INDIGOFERA *Dosua*, **10°**, 18, 63, 178, 246; *uninj.*, 182; *I. floribunda*, **0°**? 102; *I. Roylei*, **8°**, 64; *uninj.*, **8°**, 65.

IRIS, *uninj.*, **-2°**, 316, **3°**, 245, **7°**, 224, 200, 203, 254; *I. Amer. sp.*, **8°**, 64; *I. chamæiris*, 299; *I. cretensis*, **8°**, 64; *I. cristata*, 210, 334; *I. fimbriata*, **7°**, 12; *I. foetidissima*, 334; *I. germanica*, 299; *I. Guldenstœdtii*, 299; *I. Hartwegii*, **18°**, 10; *I. sp. Himal.*, **8°**, 64; *I. Histrio*, 299; *I. jap. sp.*, **8°**, 64; *I. Kämpferi*, **5°**, 203, 210, 299; *I. Notha*, 210; *I. nudiflora*, 210; *I. persica*, 299; *I. pseudacorus*, 334; *I. pumila*, 334, *vars.*, (*m*) 299; *I. reticulata*, 210; *I. setosa*, 210; *I. tenax*, 210; *I. tuberosa*, 299.

ITEA virginica, *uninj.*, **16°**, 182.

IVY (**HEDERA Helix**), (*b. z.*—**0°**) 4 (1), 13 (2), 10 (3), (**1°**—**10°**) 4 (1), 11 (2), 15 (3); *uninj.*, (*b. z.*—**0°**) 5, (**1°**—**10°**) 9, (**11°**—**20°**) 7; *Obs.*, exposed, 79, 99; sheltered, **-7°**, 99; *I. variegated*, (*b. z.*—**0°**) 5 (1), 4 (2), 2 (3), (**1°**—**10°**) 2 (1), 3 (2), 4 (3); *uninj.*, (*b. z.*—**0°**) 2, (**1°**—**10°**) 1, (**11°**—**20°**) 5.

JAMESIA, 212. **JASMINUM**, 207; *J. fruticosum*, 299; *J. multiflorum*, 190; *J. nudiflorum* **-18°**, 130, **-10°**, 304, **-2°**, 266, **-1°**, 285, (*b. z.*—**0°**) 3 (1), 4 (2), 6 (3), (**1°**—**10°**) 1 (1), 4 (2), 12 (3); *uninj.*, **-9°**, 232, **2°**, 284, **3°**, 270, (*b. z.*—**0°**) 3, (**1°**—**10°**) 10, (**11°**—**20°**) 8; *J. officinale* (*Jasmine*), (*b. z.*—**0°**) 5 (1), 7 (2), 3 (3), (**1°**—**10°**) 5 (1), 16 (2), 6 (3); *uninj.*, (*b. z.*—**0°**) 1, (**1°**—**10°**) 3, (**11°**—**20°**) 3; *J. Reevesii*, 119; *J. revolutum*, **-1°**, 30, 63, 187.

JUDAS tree (see **CERCIS**). **JUGLANS** (see **WALNUT**), 34. **JUNIPERUS aurea**, 249; *J. Bedfordiana*, 125; *J. chinensis*, **-10°**? 78, **5°**, 203, 318, **12°**, 191; *uninj.*, **6°**, 47, **7°**, 125, **10°**, 39; *J. chin. aurea*, 249; *Obs.*, 250; *J. chin. glauca*, **-13°**, 295; *J. communis* (**JUNIPER**), 108, 213; *J. c. hibernica*, 6; *J. drupacea*, 97; *J. excelsa*, **-13°**, 295;

J. Henryi, **-13°**,295; *J. japonica*, **-13°**,295; *J. j. aurea*, *uninj.*, **0°**,249,250; *J. oblonga pendula*, **-13°**,295; *J. occidentalis*, 97; *J. Perkinsii*, **0°**,228; *J. phœnicea*, **-13°**,295, **11°**,60; *uninj.*, 97; *J. prostrata*, 191; *J. recurva*, **-7°**,99; *uninj.*, 44; *J. rigida*, **-13°**,295; *J. Sabina*, 39; *J. sp. ?* (sweet scented cedar), **-4°**,41; *J. thurifera*, **11°**,60; *J. virginiana*, *uninj.*, **10°**,39,97; *J. var.*, weeping, **-10°**,304, 124.

KADSURA, **10°**,18. **KALE**, (b. z.—**0°**) 8 (1), 9 (2), 1 (3), (**1°**—**10°**) 17 (1), 9 (2), 4 (3), (**11°**—**20°**) 4 (1), 1 (2), 2 (3); *uninj.*, (**1°**—**10°**) 5; **K. scotch**, 66; **K. sea**, **6°**,199, **10°**,7, 5,54. **KALMIA** glauca, 182; **K. latifolia**, **-13°**,295, **-11°**,90, **-8°**,300, **-2°**,301, **0°**,302, **1°**,220, **2°**,243, **3°**,241, **4°**,214, **6°**,199; *uninj.*, **2°**,284, **3°**,270, **10°**,84, 200,210,212,213,238,254.

KERRIA japonica, *uninj.*, **16°**,182.

KNIPHOFIA (see **TRITOMA**) caulescens, **8°**,64; *uninj.*, **8°**,65, 63; **K. MacOweni**, **8°**,64, 63; **K. Quartiniana**, **8°**,64, 28; **K. sarmen-tosa**, **10°**,18; **K. Saundersi**, **8°**,64.

KÆLREUTERIA paniculata, **-13°**,295, 34,106; *uninj.*, **2°**,217, **3°**,270, **8°**,65, (*m*)19, (*m*)182,212,213.

LABURNUM (see **CYTISUS L.**). **LACHENALIA**, 53. **LAGERSTRÆMIA**, 63. **LAPAGERIA**, **3°**,252, **10°**,202, **15°**,10; *uninj.*, **12°**,121, **18°**,10; *Obs.*, 121. **LARDIZABALA**, **10°**,18, 207. **LARIX europæa** (**LARCH**), **1°**,304, **5°**,204, **7°**,125, 6,7,66,102,125; *uninj.*, (b. z.—**0°**) 2, (**1°**—**10°**) 13, (**11°**—**20°**) 6; *Obs.*, 66,206,251; **L. japo-nica**, *uninj.*, **13°**,295; **L. Kæmpferi**, **-13°**,295; **L. pendula**, 39; **L. sikkimensis**, 65. **LATANIA**, 8. **LATHYRUS latifolius**, 28. **LAURUS cam-phora**, **15°**,176; *uninj.*, **10°**,202; **L. nobilis** (**Bay Laurel**), (b. z.—**0°**) 36 (1), 27 (2), 2 (3), (**1°**—**10°**) 51 (1), 56 (2), 18 (3), (**11°**—**20°**) 8 (1), 17 (2), 12 (3); *uninj.*, (b. z.—**0°**) 2, (**1°**—**10°**) 2, (**11°**—**20°**) 8; *Obs.*, dry, **-3°**,26; exposed, 82; wet, 82; wind, 20; **L. regalis**, **13°**,178; **L. salicifolia**, 137. **LAUREL**, common, (**PRUNUS Laurocerasus**) (b. z.—**0°**) 25 (1), 47 (2), 4 (3), (**1°**—**10°**) 21 (1), 66 (2), 33 (3), (**11°**—**20°**) 1 (1), 12 (2), 8 (3); *uninj.*, (b. z.—**0°**) 3, (**1°**—**10°**) 4, (**11°**—**20°**) 8; *Obs.*, exposed, 93,228; sheltered, 41,228; wet, 36,42,84,85; wind, 79; *vars.*, broad-leaved,102; caucasica, **-6°**,89, **-2°**,267, **0°**,221, **4°**,73, **5°**,222, **9°**,209, **10°**,84,274; *uninj.*, **3°**,270, **14°**,299; colchica, **-1°**,

285, **0°**, 221, 302, **2°**, 164, **4°**, 5, 292, **5°**, 222, **9°**, 209, 274; *uninj.*, **3°**, 270, **10°**, 17, 299; *intermedia*, 207; *Jeffreyi*, 207; narrow-leaved, 102; round-leaved, **0°**? 102, **4°**? 73, 292, **9°**, 209, 274; *uninj.*, **3°**, 270, **10°**, 17, 84, 299; L. Portugal, (b. z.—**0°**) 23 (1), 38 (2), 11 (3), (**1°**—**10°**) 7 (1), 36 (2), 29 (3), (**11°**—**20°**) 1 (1), 6 (2), 3 (3); *uninj.*, (b. z.—**0°**) 6, (**1°**—**10°**) 6, (**11°**—**20°**) 5; *vars.*, *Azorica*, 102; myrtle-leaved, 102. LAURUSTINUS, (VIBURNUM TINUS) (b. z.—**0°**) 32 (1), 18 (2), 1 (3), (**1°**—**10°**) 38 (1), 65 (2), 14 (3), (**11°**—**20°**) 8 (1), 16 (2), 11 (3); *uninj.*, (b. z.—**0°**) 1, (**1°**—**10°**) 1, (**11°**—**20°**) 11; *Obs.*, dry, 82; exposed, 82, 121; sheltered, 121; wet, 36. LAVENDER, (b. z.—**0°**) 11 (1), 10 (2), 2 (3), (**1°**—**10°**) 20 (1), 19 (2), 6 (3), (**11°**—**20°**) 2 (1), 1 (2); *uninj.*, (b. z.—**0°**) 2, (**1°**—**10°**) 3, (**11°**—**20°**) 5.

LEDUM, **0°**? 102; *uninj.*, **16°**, 182. LEEK, **-8°**, 135, **1°**, 162, **7°**, 165. LEPTOSPERMUM, lanigerum, **6°**, 47, **10°**, 202, 318, **12°**, 148, 223; *uninj.*, **3°**, 270, **11°**, 94, 22†; L. scoparium, **1°**, 139, **10°**, 318, **14°**, 299, 223; *uninj.*, **3°**, 270, 120. LESPEDEZA, **-13°**, (m) 295. LETTUCE, (b. z.—**0°**) 14 (1), 4 (2), 2 (3), (**1°**—**10°**) 22 (1), 11 (2), 6 (3), (**11°**—**20°**) 3 (1), 3 (2); *uninj.*, (b. z.—**0°**) 4, (**1°**—**10°**) 5, (**11°**—**20°**) 4; *vars.*, All the year round, **9°**, 4, 336, **11°**, 308; Brown Dutch, *uninj.*, **-6°**, 313, 321; Daniel's Giant white, 327; Daniel's green winter, 327; Drumhead, **12°**, 331, 321; Hardy Bath Cos, **4°**, 333; *uninj.*, **2°**, 284; Hardy green, **-9°**, 289, **11°**, 308; Hammersmith, Hardy or Lee's, **5°**, 318; Do. green or green-ribbed, **3°**, 241, 327; *uninj.*, **-6°**, 313; **-2°**, 301; **0°**, 259; Hicks' hardy white, **5°**, 318; *uninj.*, **-6°**, 313; Moor park, 205; Stanstead Park, **10°**, 337; Tennis ball, 327; Wheeler's Tom Thumb, 271, 327, 331. LEUCOCRINUM, 220. LEUCOPOGON, 10. LEUCOPHYTA, **10°**, 18. LEYCESTERIA, (b. z.—**0°**) 3 (1), 5 (2), 1 (3), (**1°**—**10°**) 11 (1), 11 (2), 11 (3), (**11°**—**20°**) 2 (1), 2 (2), 2 (3); *uninj.*, **9°**, 209, **10°**, 202, 20, 51, 117.

LIBERTIA formosa, **1°**, 140, **8°**, 65; L. fruticosa, **10°**, 318; L. grandiflora, 63; *uninj.*, 183; L. ixioides, 63, 220. Libocedrus chilensis, **-13°**, 295, **0°**, 274, 21; *uninj.*, **3°**, 270, 22†, 300; L. decurrens, **-18°**, 130, **-13°**, 295, **-8°**, 135, **7°**, 152; *uninj.*, **3°**, 270, **10°**, 39, 22†, 254, 300; L. Doniana, **15°**, 21; L. viridis, **-13°**, 295; *uninj.*, **3°**, 270, 22†. LIBONIA, 20. LIGUSTRUM coriaceum, **5°**, 29, **6°**, 47, **10°**, 60, 207; L. japonicum, **-6°**, 89, **0°**, 135, (b. z.—**0°**) 5 (2), 2 (3), (**1°**—**10°**) 3 (1), 4 (2), 2 (3); *uninj.*, **1°**, 305, 182,

(var. latifolium), **-2°**,103, **0°**?256; *L. lucidum*, **-4°**,278, **-2°**,267, **-1°**,285, **0°**,256,302, 267, (b. z.—**0°**), 2 (1), 2 (2), 2 (3), (**1°**—**10°**), 7 (1), 7 (2), 4 (3); *uningj.*, **2°**,284, **3°**,270, **7°**,245, 22†, 212,300,334; *L. ovalifolium*, **7°**,125,194,207; *L. robustum*, 256; *L. sinense*, 207; *uningj.*, 182,212; *L. vulgare* (Privet), (b. z.—**0°**) 5 (1), 9 (2), 8 (3), (**1°**—**10°**) 2 (1), 13 (2), 5 (3); *uningj.*, **-2°**, 316, (b. z.—**0°**) 3, (**1°**—**10°**) 8, (**11°**—**20°**) 8. LILAC, **-8°**,135, **5°**,204; *uningj.*, **-12°**,310, **-9°**,232, **-2°**,316, **3°**,270. LILIUM auratum, **-1°**,285, **5°**,159,204, **9°**,213, **15°**,15; *uningj.*, **18°**,10, **25°**,8, 14, 22†,200,210,238,334; *L. Brownii*, 10; *L. candidum*, **5°**,80, **10°**,16; *L. californicum*, 281; *L. excelsum*, **-1°**,285; *uningj.*, **9°**,213, 22†; *L. giganteum*, *uningj.*, **18°**,10, **31°**,51; *L. krameri*, 220; *L. lancifolium*, [speciosum?] **-1°**,285, **5°**,203,204, 43,248, 254; *uningj.*, 8,10, 22†,200,213,238,334; *L. pardalinum*, 65; *L. sp.*, American and Japanese, **8°**,65, 86; *Obs.*, fine, 281. LIME, **-10°**, 113. LIMONIA (CITRUS), *uningj.*, **10°**,19,212. LIMONIASTRUM, 63. LIQUIDAMBAR chinensis, 207; *L. styraciflua*, **-13°**,295, **-2°**,112, **0°**? 254,256, **6°**,47, 50,187; *uningj.*, **1°**,233, **3°**,270, **5°**,203, 200,212, 222,238. LIRIODENDRON, **-1°**,41, **5°**,231, 9,13,59,97; *uningj.*, **-6°**, 89, **10°**,84. LITHOSPERMUM fruticosum, **0°**,92, **16°**,63; *L. petræum*, 10; *L. prostratum*, **0°**,82, **8°**,65. LITHREA (RHUS), (*m*) 211.

LOBELIA cardinalis, **2°**,243, **15°**,176, **17°**,190; *uningj.*, **3°**,270; *L. repens*, 183,334; *L. syphilitica*, **2°**,243, **7°**?28. LOMARIA, **31°**, 149. LOMATIA, **15°**,10. LONICERA brachypoda, *var.*, aureo-retic., **-4°**,99, **4°**,127,217, **5°**,137, **8°**,124, **10°**,145, **13°**,95, **17°**,190; *uningj.*, 232; *L. flexuosa*, **-13°**,295, **2°**,141, **4°**,217, **10°**,185; *L. fragrantissima*, **-13°**,295, **-6°**,89, **-1°**,285, **0°**,82,274,302, (b. z.—**0°**) 4 (1), 5 (2), 3 (3), (**1°**—**10°**) 5 (1), 4 (2), 3 (3); *uningj.*, **2°**,284, **5°**, 203, **9°**,209, 182,212,300; *L. grata*, **-13°**,295, *L. japonica*, **-13°**, 295, **-10°**,304, **-6°**,89, **-2°**,301, **0°**,274, (b. z.—**0°**) 5 (2), 2 (3), (**1°**—**10°**) 3 (1), 4 (3), 3 (3), (**11°**—**20°**) 1 (1), 1 (2); *uningj.*, **3°**,270, 22†,248,300,334, (b. z.—**0°**) 2, (**1°**—**10°**) 4, (**11°**—**20°**) 4; *L. Ledebourii*, 182; *L. Periclymenum* (see HONEYSUCKLE), *L. reticulata*, **2°**,48; *L. sempervirens* (ever-green), **-18°**,130, **2°**,179, 34; *uningj.*, **16°**,182; *L. tartarica*, 182.

LUPINUS arboreus, **10°**,18.

LYCHNIS, 220. LYCIUM barbarum, 19; *L. purpureum*, 63.

MACLURA, **-13°**,295, **5°**,29,203,222; *uningj.*, **10°**,19,22†. MAG-

NOLIA acuminata, 203; *M. conspicua*, **15°**, 54; *uninj.*, 208; *M. ferruginea*, 60; *M. glauca*, 7; *M. gracilis*, 207; *M. grandiflora*, **-13°**, 129, **-6°**, 89, **-5°**, 110, **-3°**, 25, **-2°**, 112, **0°**, 82, 274, (b. z. **-0°**) 4 (1), 7 (2), 1 (3), (**1°-10°**) 16 (1), 25 (2), 17 (1), (**11°-20°**) 1 (1), 7 (2), 6 (3); *uninj.*, (b. z. **-0°**) 1, (**1°-10°**) 3, (**11°-20°**) 9; *Obs.*, 82, 165, 225; *Do.*, var. *Exmouth*, (*Oxoniensis*), **-13°**, 295, **2°**, 234, **3°**, 199, 269, (*m*) 20, 201, 223; *uninj.*, 200; *M. obovata*, 208; *M. stellata*, 19; *M. Soulangiana*, 2; *M. Thomsonii*, 19. *MAHONIA* (see *BERBERIS*) *angulosa*, 207; *M. aquifolia*, 108; *M. Bealeii*, **7°**, 125; *uninj.*, 256; *M. fascicularis*, **8°**, 65; *uninj.*, **8°**, 65; *M. Fortunei*, 65; *M. intermedia*, 256; *M. japonica*, 256; *M. nepalensis*, **8°**, 65; *M. pallida*, 207; *M. trifoliata*, 63; *M. sp.*, 59, 182. *MALVA*, *sp.*, 28. *MANDEVILLA*, **8°**?, 22, **18°**, 57, 63, 241; *uninj.*, **18°**, 10, 58. *MARGYRICARPUS*, 63. *MARIGOLD*, 54. *MARRUBIUM* (*HOREHOUND*), **5°**, 80, 187. *MAURANDIA*, 51.

MECONOPSIS *aculeata*, **8°**, 65, 10; *M. nepalensis*, 65; *M. Wallichii*, 65. *MEDLAR*, **3°**, 269; *uninj.*, (b. z. **-0°**) 2, (**1°-10°**) 10, (**11°-20°**) 2. *MELIANTHUS*, **8°**, 65, **10°**, 202, 54. *MENISPERMUM*, 182. *MENTHA* *Pulegium*, 80. *MENZIESIA* *globularis*, 207; *M. polifolia*, **-13°**, 295, **-10°**, 113, **-8°**, 135, **10°**, 318, 246; *Do.* var. *alba*, 108; *uninj.*, **2°**, 316, **3°**, 270, **9°**, 6, 334, 22†, 182. *MESEMBRY-ANTHEMUM* *crystallinum*, 51; *M. uncinatum*, 63, 140. *METROSIDEROS* *floribunda* 10; *M. robusta*, 63.

MIKANIA, 18. *MILLA*, **8°**, 65, **18°**, 10. *MIMULUS* *alatus*, 28; *M. moschatus*, 12. *MIRABILIS*, 220. *MITRARIA* *coccinea*, **5°**, (*m*) 150, **8°**, 65, **10**, 318, **12°**, 148; *uninj.*, 184, 220.

MONTBRETIA, *uninj.*, **9°**, 6, 334, **10°**, 19, 63. *MORUS* *constantinopolitana*, **-13°**, 295; *M. hispanica*, **-13°**, 295; *M. nigra* (*Mulberry*), **-9°**, 232, **-7°**, 99, **-5°**, 8, 89, **-2°**, 301, (b. z. **-0°**) 2 (1), 1 (2), 5 (3), (**1°-10°**) 1 (1), 3 (2), 5 (3); *uninj.*, (b. z. **-0°**) 5, (**1°-10°**) 4, (**11°-20°**) 3; *Obs.*, fruit, none, 33; wood killed, 45; young tree killed, 84.

MUEHLENBECKIA, 183; *M. adpressa*, 207; *M. complexa*, **10°**, 18, **13°**, 178; *M. sagittifolia*, (*m*) 18; *M. varians*, (*m*) 63. *MUSA* *Ensete*, 51. *MUTISIA* *Clematis*, 18; *M. decurrens*, 10.

MYOSOTIS, 108. *MYRICA*, 56. *MYRSINE*, 178. *MYRSIPHYLLUM*, 63. *MYRTUS* *apiculata*, 50; *M. communis* (*MYRTLE*), (b. z. **-0°**) 8 (1), 3 (2), (**1°-10°**) 20 (1), 18 (2), 4 (3), (**11°-20°**) 7 (1), 10 (2), 7 (3); *uninj.*, **8°**, 5, 95, **12°**, 118, var.

double, 149; *Obs.*, dry, 117, 118; exposed, 95; situation low and wet, 117.

NANDINA, 10°, 18, 50, 207, 211, 223; *uninj.*, 22†, 51, 63. NARCISSUS albidus, 334; N. Bazelman major, 337; N. bicolor, 334; N. Bulbocodium, 300, 334; N. Burbidgei, 334; N. cernuus, 334; N. citrina, 300; N. crystallinus, 330, 334; N. elegans, 65; N. Graelsii, 300; Grand Monarque, 337; N. Horsfieldii, 334; N. Humei, 334; N. juncifolius, 65; *uninj.*, 300; N. minor (nanus), 334; N. odoratus, 334; N. pachybolbos, 65; N. pallidulus, 300; N. Pearl, 337; N. polyanthus, 269; N. Queen Victoria, 337; N. Soleil d'or, 337; N. tortuosus, 334; N. triandrus, 65; N. sp., *uninj.*, 2°, 284, 3°, 270, 5°, 203, 9°, 209, 22†, 201, 254.

NECTARINE, (b. z.—0°) 1 (1), 7 (2), 8 (3), (1°—10°) 4 (1), 10 (2), 10 (3), (11°—20°) 1 (1), 5 (2), 2 (3); *uninj.*, (b. z.—0°) 3, (1°—10°) 7, (11°—20°) 3; vars., Downton, 267; Elruge, 267; Do. vars., *uninj.*, 257; El., Stanwick, 226; Hardwick's Seedling, 226; Impératrice, 226; Lord Napier, 226; Newington, 257; Pine Apple, 226; Victoria, 331; Violette Hâtive, 226; *Obs.*, crop (1880), deficient, 58; good, 41; none, 13, 48, 120, 138; "curl," 70; injuries, 46, 112; wet, effects of, 9; wood unripened, 13, 70, 175; young and old, 41. NEGUNDO, -13°, 295, 6°, 286, 106, 211, 285; *uninj.*, 1°, 233, 3°, 270, 5°, 203, 222, 9°, 209, 22†, 285. NEILLIA, 18. NERINE, -1°, 30. NERTERA, 183, 334.

NUT, 46. NUTTALLIA, *uninj.*, -13°, 295, 16°, 182.

NYSSA multiflora, 10°, 18.

OAK (*see* QUERCUS Robur).

ÆNOTHERA anisoloba, 28; Æ. macrocarpa, 122, 181, 220; Æ. taraxacifolia, 28.

OLEA buxifolia, 15°, 176; O. europæa, 10°, 18, 202, 63; O. excelsa, 176; O. fragrans, 65; O. ilicifolia (*see* OSMANTHUS); O. sylvestris, 54. OLEARIA Haastii, 1°, 140, 304, 2°, 216, 3°, 269, 5°, 231, 8°, 65, 21, 187, 201, 223, 256; *uninj.*, -13°, 295, 6° 5, 240, 7°, 125, 10°, 19, 202, 22†, 63, 208, 212, 240, 300; O. myrsinoides, 207.

ONIONS, winter, (b. z.—0°) 5 (1), 12 (2), 3 (3), (1°—10°) 16 (1), 7 (2), 10 (3), (11°—20°) 3 (1), 1 (2); *uninj.*, (b. z.—0°) 2, (1°—10°) 5, (11°—20°) 4.

OPHIPOGON Jaburan, 12; O. spicatum, (m) 82. OPUNTIA, 203.

ORCHIS, foliosa, *uninj.*, 10° , 19, 220; O. sambucina, 220. OREODAPHNE, -13° , 295, 63. ORIGANUM, 220. OROBUS, 2 sp., 28.

OSMANTHUS aquifolius, -13° , 295, 0° , 324, 2° , 216, 107, 187; 5° , 29; *uninj.*, 3° , 270, 4° , 217, 22†, 212, 238; O. argenteus, 187; O. ilicifolius (OLEA ilic.), -13° , 129, 295, -4° , 278, 0° , 324, 1° , 140, 2° , 5° , 318, var. varieg., 0° ? 102, 6° , 47; *uninj.*, 3° , 270, 5° , 203, 6° , 47, 10° , 19, 21, 22†, 97, 118, 182, 201, 238; O. sp., 135; *uninj.*, 9, 256.

OTHERA japonica, 256. OTHONNA cheirifolia, 18, (*m*) 63.

OURISIA coccinea, 8° , 65; *uninj.*, 10° , 19.

OXALIS, sp., 63; O. Deppei, 28; O. floribunda, 183; O. lasiandra, 28; O. tropæoloides, 108.

OZOTHAMNUS rosmarinifolius, 13° , 178; *uninj.*, 16° , 182; O. thyrsoides, (*m*) 50, 176.

PACHYSTIGMA, 19. PÆONIA (PÆONY), -18° , 130, -5° , 8, 89. PALLURUS, -13° , 295, -3° , 244, 1° ? 34, 12° , 123; *uninj.*, 22† 208, 212. PAMPAS GRASS, (GYNERIUM) (b. z.— 0°) 13 (1), 9 (2), (1° — 10°) 21 (1), 25 (2), 9 (3), (11° — 20°) 11 (1), 10 (2), 4 (3); *uninj.*, (b. z.— 0°) 2, (1° — 10°) 1, (11° — 20°) 6; *Obs.*, alts. different, 45; dry, 82; wet, 55, 68. PANSY, 4° , 73; *uninj.*, 43. PARANEPHELIUS, 65. PARIS, 181. PAROCHETUS, 181. PARSLEY, (b. z.— 0°) 6 (1), 9 (2), 5 (3), (1° — 10°) 10 (1), 18 (2), 10 (3), (11° — 20°) 1 (1), 2 (2), 1 (3); *uninj.*, (b. z.— 0°) 2, (1° — 10°) 9, (11° — 20°) 5. PARROTIA 19, 202. PARSNIP, 43. PASSIFLORA cœrulea, (b. z.— 0°) 2 (1), (1° — 10°) 9 (1), 1 (2), 1 (3), (11° — 20°) 4 (1), 2 (2); *uninj.*, (11° — 20°) 3; P. lutea, 63. PASTINACA lucida, 28. PAULOWNIA, (1° — 10°) 7 (1), 4 (2), 5 (3); *uninj.*, -13° , 295, 3° , 270, 4° , 215, 7° , 17, 10° , 48, 22†, 238; *Obs.*, sheltered, 16. PAVIA, sp., 9; P. macrostachya, 65, 212.

PEA, 38. PEACH, (b. z.— 0°) 6 (1), 11 (2), 7 (3), (1° — 10°) 11 (1), 18 (2), 13 (3), (11° — 20°) 4 (1), 12 (2), 6 (3); *uninj.*, (b. z.— 0°) 3, (1° — 10°) 7, (11° — 20°) 3; Vars., Albatross, 12° , 331; Albert, 12° , 331; Alexandra, -4° , 278, 3° , 226, 7° , 33, 12° , 331, 257; Alice, 7° , 33; Barrington, 3° , 226; *uninj.*, 3° , 270, 257; Bellegarde, -2° , 267; *uninj.*, 3° , 270; Dagmar, -4° , 278; Diamond, (*m*) -4° , 278, 7° , 33; Dr. Hogg, -4° , 278, 3° , 72, 7° , 33; Early Beatrice, -4° , 278; Early Alfred, 257; Galande (*m*, "Bellgarre") 270; Goshawk, 33; Grosse Mignonne, (*m*) 257; Hales' Early, 270; Hâtive (see VIOLETTE); Late Admirable, 267, (*m*) 289;

Lord Palmerston, 33,278; Malta, Noblesse, **-9°**,289, **-4°**,278, **3°**,226, **7°**,33,257, **-9°**,331; Prince of Wales, 33; Princess of Wales, 226; Red Magdalen, 267; Royal George, 267; *uninj.*, 257, 270, 289; South Hampstead, 270; Stirling Castle, 33; Victoria, 33; Violette Hâtive,(*m*)33, 331; Walburton Admirable, 226; vars., 72; *uninj.*, 289; *Obs.*, crop (1880), av. or fair, 51,112; def., 35,55,58; good, 41, (1881) 321; none, 6,13,35,48,52,68,79, 120,138,155,160; foliage late, 52; renewal of, 51; pith black, 52; recovering, 46,112,155; wet, 29,41; wood unripened, 13,23 35,43,52, 55,68,70,170,175. PEAR, (b. z.—**0°**) 3 (1), 8 (2), 10 (3), (**1°—10°**) 3 (1), 10 (2), 12 (3), (**11°—20°**) 2 (1), 4 (2), 3 (3); *uninj.*, (b. z.—**0°**) 4, (**1°—10°**) 12, (**11°—20°**) 6; vars., Beurré d'Amanlis, **-17°**,307; B. Diel,(*m*)151; B. de l'Assumption, **-3°**, 25; Bon Chrétien, 296; Chaumontel, **-17°**,307; Doyenné du Comice, **-4°**?279; Duchesse d'Anjou, 151; Jargonelle, **-17°**,307, **-4°**?279; Marie Louise, 296; Swan's Egg, **-17°**,307; *Obs.*, bark split, 41. Crop (1880), def., 9,55,67,69,70,130,163,197; (1881) 302; good, 51,68,74,138,151; none, 5,48,68,81,120,121,124,128,138, (Hardier sorts) 151,156,168,189,190; pith browned, 26; wet, effects of, 26,68,86,164; wood unripened, 55,130. PELARGONIUM, 51. PENSTEMON, (b. z.—**0°**) 6 (1), 3 (3), (**1°—10°**) 20 (1), 1 (2), 3 (3), (**11°—20°**) 3 (1), 1 (2); *uninj.*, **2°**,284, 254; P. 3 sp., 300; P. 4 sp., 334. PERAPHYLLUM, **10°**,18; *uninj.*, 212. PERIPLOCA, *uninj.*, **10°**,19, 210. PERNETTYA angustifolia, *uninj.*, **-13°**,295, **16°**, 182; P. floribunda, 295; P. mucronata, **-18°**,130, **-13°**,295, **-8°** 135, **16°**7,190; P. pilosa, 207; *uninj.*, 182; P. speciosa; *uninj.*, **15°**,56, 182; P. sp., **5°**,80, **7°**?102, 119. PETALOSTEMON, **10°**,19. PHILADELPHUS, **-11°**,134; *uninj.*, 59; P. Gordonii, 232; P. grandiflorus, 182; P. mexicanus, 19; P. speciosissimus, (*m*)182; P. triflorus, 19. PHILESIA, **10°**,74; *uninj.*, **9°**6,334, **10°**,202. PHILLODENDRON, 211. PHILLYREA, **-1°**,45, **0°**,221, **6°**47, **1°**?34; P. angustifolia, **-13°**,295, **-1°**,30, **0°**,274, **2°**,284, **3°**,199,300, **5°**,203, 222,318; *uninj.*, **3°**,270, **4°**,215, **9°**,209, 22†,182,201,210,212; P. latifolia, 148; *uninj.*, 182; P. ligustrifolia, 60; P. media, **-1°**, 30, **0°**,274, **5°**,222, 207,272; *uninj.*, **3°**,270, 22†,212, (*m*)215; Do. var. buxifolia, 207,256; P. oleæfolia, **-13°**,(*m*)295, 256; P. Vilmoriniana, 208,256. PHLOMIS, 208. PHORMIUM tenax, (b. z.—**0°**) 3 (1), 1 (2), (**1°—10°**) 15 (1), 9 (2), 1 (3), (**11°—20°**) 3 (1), 5 (2), 5 (3); *uninj.*, **13°**,22, **20°**,173, **27°**,8; var. Colensoi, 50,

179; *Do.*, *var. variegatum*, 51; *uningj.*, 184, 238; *var. Veitchii*, 51. *PHOTINIA* *glabra*, -13°, 295, 107, 223; *uningj.*, 3°, 270; *P. serrulata*, -13°, 295, 1°, 31, 3°, 244, 5°, 203, 7°, 12, (b. z.—0°) 2 (1), (1°—10°) 1 (1), 4 (2), 3 (3); *uningj.*, 3°, 270, 11°, 94, 15°, 21, 19°, 149, 20°, 120. *PHYGELIUS*, 194; *uningj.*, 19, 22†.

PICEA (see also *ABIES*) *amabilis*, -1°, 30, 3°, 300, 6°, 286; *uningj.*, -13°, 295, 3°, 270, 5°, 222, 22†, 97, 109, 201, 256; *P. baborensis*, (m) 97; *P. balsamea*, 80; *P. bifida*, *uningj.*, -13°, 295; *P. bracteata*, -13°, 295, (b. z.?) 256, 1°, 31, 3°, 166, 4°, 35, 73, 119; *P. cephalonica*, -4°, 278, -2°, 267, 3°, 166, (m, *var.*) 48; *Obs.*, 267, 303; *uningj.*, -13°, 295, 3°, 270, 8°, 151, 15°, 56, 22†, 97, 201, 254, 256; *P. concolor*, *uningj.*, -13°, 295; *P. excelsa*, 189; *P. firma*, 1°, 31; *P. grandis*, -4°, 278, 3°, 166, 199, 226, 4°, 198, 214, 5°, 318, 6°, 205, 19°, 59; *uningj.*, -13°, 295, 3°, 270, 22†, 97, 201, 256; *P. lasiocarpa*, (see also *Lowiana*) -4°, 278, -1°, 285, 3°, 226, 269, 4°, 73, 163, 5°, 318, 6°, 205, 286, 303, 9°, 228, 12°, 192, 14°, 14, (b. z.—0°) 4 (3), (1°—10°) 1 (1), 4 (2), 7 (3), (11°—20°) 3 (3); *uningj.*, -13°, 295, 0°, 156, 249, 1°, 233, 10°, 39, 22†, 97, 109, 201, 254, 256, (b. z.—0°) 5, (1°—10°) 4, (11°—20°) 6; *P. Lowiana*, (see also *Lasiocarpa*) -6°, 329, -4°, 278, 6°, 286, 14°, 14; *uningj.*, 3°, 270, 4°, 35, 22†, 201; *P. magnifica*, *uningj.*, -13°, 295, 97; *P. nobilis*, *uningj.*, -5° 8, 89, 0°, 156, 249, 7°, 125, 8°, 151, 10°, 39, 54, 97, 109; *P. Nordmanniana*, -6°, 329, -1°, 285, 1°, 287, 4°, 329, 6°, 303, 10°, 39; *uningj.*, -13°, 295, -7°, 290, -5° 8, 89, 0°, 156, 249, 1°, 233, 2°, 284, 3°, 270, 4°, 35, 215, 5°, 203, 222, 8°, 151, 9°, 209, 213, 22†, 97, 111, 201, 254; *P. numidica*, 1°, 31; *P. pectinata*, 2°, 216, 53; *uningj.*, -13°, 295, 2°, 284, 3°, 270, 4°, 35, 48, 22†; *P. Pichta*, *uningj.*, 6°, (m) 156; *P. Pindrow*, -13°, 295, -1°, 30, 2°, 216, 5°, 292, 10°, 39, 22*; *uningj.*, 3°, 270; *Obs.*, 30, 39, 292; *P. Pinsapo*, -18°, 130, -13°, 295, -11°, 134, -10°, 304, -8°, 300, -7° 99, -5° 8, 89, -2°, 267, 301, -1°, 45, 285, 0°, 36, 92; (b. z.—0°) 3 (1), 7 (2), 11 (3), (1°—10°) 2 (1), 12 (2), 14 (3), (11°—20°) 2 (2), 4 (3); *uningj.*, 1°, 233, 3°, 270, 5°, 222, 10°, 48, 15°, 21, 20, 22†, 44, 97, 201, 254; (b. z.—0°) 2, (1°—10°) 9, (11°—20°) 4; *var. variegata*, 1°, 31; *Obs.*, exposed and sheltered, 79; *P. religiosa*, 176; *P. Veitchii*, 295; *P. Webbiana*, 3°, 166, 4°, 73, 119, 5°, 292.

PINK (see *CARNATION*), 108. *PINUS*, *Obs.*, 140, 308; *P. amecaensis*, (*P. Hartwegi*) 1°, (m) 140; *P. argentea* (see *P. sylvestris*), 3°, 166; *P. austriaca*, 0°, 37, 15°, 15; *uningj.*, 10°, 39; *P. Benthamiana*, 1°, 31;

P. Brutea, $1^{\circ}, 31$; *P. Cembra*, $2^{\circ}, 101$; *uningj.*, $-5^{\circ} 8$ 89, $10^{\circ}, 39$; *Obs.*, (m), 39; *P. devoniana*, $1^{\circ}, 140$, $2^{\circ}, 32$; *uningj.*, $0^{\circ}, 250$; *P. Don Pedri*, $1^{\circ}, 31$; *P. excelsa*, $-13^{\circ}, 295$, $-6^{\circ}, 329$, $-2^{\circ}, 267$, $-1^{\circ}, 285$, $0^{\circ}, 302$, $1^{\circ}, 31$, $5^{\circ}, 204, 318$, $9^{\circ}, 95, 266$, $10^{\circ}, (m) 34, 39, 185$; *uningj.*, $0^{\circ}, 92$, $1^{\circ}, 233$, $3^{\circ}, 270$, $5^{\circ}, 203, 222$, $9^{\circ}, 213$, $22\frac{1}{2}, 109, 201, 254$; *P. Gerardiana*, $10^{\circ}, 39$; *P. halepensis*, $-1^{\circ}, 30$, $1^{\circ}, 31$, 254; *uningj.*, $3^{\circ}, 270$, $22\frac{1}{2}$; *P. Hartwegi*, $1^{\circ}, 31$ (see *P. amecaensis*); *P. insignis*, $-13^{\circ}, 295$, $-2^{\circ}, 267$, $-1^{\circ}, 30, 285$, $0^{\circ}, 37$, $1^{\circ}, 31, 35$, $2^{\circ}, 32, 216, 284$, $3^{\circ}, 199, 226$, 300 , $4^{\circ}, 35, 198, 214$, $5^{\circ}, 29, 204$, (b. z.— 0°) 7 (1), 1 (2), 1 (3), (1° — 10°) 9 (1), 8 (2), 6 (3), (11° — 20°) 9 (1), 5 (2), 6 (3); *uningj.*, $0^{\circ}, 38$, $3^{\circ}, 270$, $4^{\circ}, 215$, $9^{\circ}, 209$, $13^{\circ}, 22$, $15^{\circ}, 255$, (*Obs.* of growth) $0^{\circ}, 109, 202, 254, 258$, (b. z.— 0°) 3, (1° — 10°) 7, (11° — 20°) 8; *Bark burst*, 239; *P. koraiensis*, 256; *P. Lambertiana*, $1^{\circ}, 31$; *uningj.*, $10^{\circ}, 39$, 109; *P. Laricio*, $-13^{\circ}, 295$, $-5^{\circ}, 110$, $-4^{\circ}, 278$, $5^{\circ}, 204, 318$, $15^{\circ}, 15$; *uningj.*, $-7^{\circ}, 290$, $2^{\circ}, 284$, $3^{\circ}, 270$, $4^{\circ}, 215$, $5^{\circ}, 222$, $9^{\circ}, 213$, $10^{\circ}, 39$, $22\frac{1}{2}, 201, 254$, (b. z.— 0°) 4, (1° — 10°) 11, (11° — 20°) 2; *P. Llaveana*, 123; *P. macrocarpa*, 34, 254; *P. macrophylla*, $-7^{\circ}, 99$; *P. monticola*, *uningj.*, $8^{\circ}, 151$; *P. Parryana*, *uningj.*, $0^{\circ}, 250$; *P. patula*, $1^{\circ}, 140$; *uningj.*, $12^{\circ}, 238$; *P. pinaster*, $10^{\circ}, 39$; *P. pinea*, $-13^{\circ}, 295$, $-4^{\circ}, 241$, $-1^{\circ}, 30$, $1^{\circ}, 233$, $6^{\circ}, 303$, $12^{\circ}, 254$; *uningj.*, $3^{\circ}, 270$, $22\frac{1}{2}, 201, 256$; *P. ponderosa*, 39; *P. Sabiniana*, 39; *P. Sinclairii*, $1^{\circ}, 31$; *P. sylvestris*, $-4^{\circ}, 278$, $5^{\circ}, 204$, 15; *uningj.*, $1^{\circ}, 233$, $3^{\circ}, 270$, $4^{\circ}, 215$, $5^{\circ}, 203, 222$, $9^{\circ}, 213$, 254, (b. z.— 0°) 3, (1° — 10°) 12, (11° — 20°) 4. *PIPTANTHUS*, $-13^{\circ}, 295$, $1^{\circ}, 140$, $9^{\circ}, 213$, $10^{\circ}, 318$, 107, 223, 254; *uningj.*, $10^{\circ}, 19$, $22\frac{1}{2}, 108$, 212. *PISTACIA vera*, 63; *P. Lentiscus*, 63. *PITIOSPORUM Buchananii*, 211; *P. revolutum*, 178; *P. tenuifolium*, 208, 299; *uningj.*, $20^{\circ}, 120$; *P. Tobira*, $-13^{\circ}, 295$, $-2^{\circ}, 301$, $2^{\circ}, 216$, $3^{\circ}, 241$, $10^{\circ}, 202$, $12^{\circ}, 123, 237$, $15^{\circ}, 176, 200$, $22^{\circ}, 50, 208$; *P. T. variegatum*, 50.

PLAGIANTHUS, 208. *PLANERA*, 18. *PLATANUS occidentalis*, 107; *uningj.*, $22\frac{1}{2}$; *P. orientalis* (Plane), $2^{\circ}, 32$, $5^{\circ}, 204$, $13^{\circ}, 5$, $15^{\circ}, 15$, 13, 17; *Obs.*, 46; *uningj.*, $-12^{\circ}, 310$, $-2^{\circ}, 316$, $1^{\circ}, 233$, $3^{\circ}, 270$, $5^{\circ}, 203$, 222, $12^{\circ}, 123$, $22\frac{1}{2}, 201, 212, 254$. *PLATYCODON*, 181. *PLATYCRATER*, $10^{\circ}, 18$; *uningj.*, $6^{\circ}, 303$. *PLUM* (b. z.— 0°), 1 (2), 5 (3), (1° — 10°) 4 (2), 3 (3); *uningj.*, (b. z.— 0°) 4, (1° — 10°) 10, (11° — 20°) 6; *vars.*, all but Golden Drop, *uningj.*, $3^{\circ}, 270$; *Black Perdrigon*, (m) 313; *Bullace*, 313; *Damson*, *uningj.*, $8^{\circ}, 151$, $10^{\circ}, 70$; *Golden drop*, $3^{\circ}, 270, 269$, $9^{\circ}, 77$; *uningj.*, 313, $13^{\circ}, 5$; *Greengage*, *uningj.*, 313, $13^{\circ}, 5$; *Ickworth Impératrice*, 313; *Jefferson*, $3^{\circ}, 226$,

279; Orleans, 5; Prince of Wales, 226; Reine Claude de Bavay, 3° , (m) 226; *uningj.*, -6° , 313; Victoria, 3° , 226; *uningj.*, -6° , 313; Washington, 9° , 77; *uningj.*, -6° , 313; White magnum bonum, 313; *Obs.*, crop (1880), av. or fair, 41, 48, 69, (Damsons) 70, 138, 151 def., 70, 79, 120, 128, 130, 151, 156, 302; good, 58, 79, 81; none, (Orleans) 5, 128, 160, 189, 197; wet, effects of, on, 86; wood unripened, 130. PLUMBAGO, 181.

PODOCARPUS alpina, 32; P. andina (see PRUMNOPITYS), -13° , 295, 0° , 221, 319, 1° , 31, 2° , (m) 32, 216, 5° , 29, 318, 10° , 18, 21, 211, 246; *uningj.*, 4° , 217, 22†; P. chinensis, 5° , 319, 15° , 21, (m) 63, 254; *uningj.*, 3° , 270, 4° , 215, 15° , 21; P. koraiana, (m) 223. PODOCYTISUS, 211. POINSETTIA, 9. POLEMONIUM, 80. POLYANTHUS, 95. POLYGONUM, 65. POPULUS angulata, 5° , 203, 7° , (m) 12; P. nigra (Black Poplar), 37; P. pyramidalis (Lombardy P.) -11° , 90, -1° , 45, 0° ? 102, 10° ? 37, 17, 37, 246, 286; *Obs.*, 37, 46, 286. POTATO, 0° , 38, 10° ? 38, 20; *uningj.*, -5° ? 42. POTENTILLA, 182.

PRIMULA acaulis, 12; P. amæna, 2° , 243; P. capitata, 65; P. cashmeriana, 2° , 243, 16° , 181; P. cortusoides, 2° , 243, 304; P. denticulata, 2° , 243; P. japonica, 2° , 243, 26° , 51; *uningj.*, -10° , 304; P. purpurea, 181; P. rosea, 2° , 243, 16° , 181; P. sikkimensis, 10; P. vulgaris (Primrose), 108. PRIVET (see LIGUSTRUM vulgare). PRUMNOPITYS (see PODOCARPUS andina), 97, 102, 119, 160. PRUNUS ilicifolius, 1° , 140; P. laurocerasus (see LAUREL, common); P. sinensis, 0° ? 102; P. triloba, 10° , 18.

PSORALEA bituminosa, 13° , 178.

PTEROCARYA caucasica, 182; P. stenophylla, (hyb.) 208. PTEROSTYRAX hispidulum, 63.

PUNICA Granatum (POMEGRANATE), -1° , 30, 41, 8° ? 22, 12° , (fl. pl.) 123, 13° , 178, 15° , 176, 187; *uningj.*, 69, 182. PURSHIA, 19.

PYRETHRUM, 43. PYROLA, 181. PYRUS Aucuparia, -11° , 134; P. floribunda, -13° , 295; P. japonica, -13° , 295, -11° , 134, -8° , 300, -4° , 278, 2° , 284, 6° , 303; *uningj.*, -13° , 295, -7° , 290, (b. z.— 0°) 4, (1° — 10°) 12, (11° — 20°) 9; P. vestita, 1° , 140.

QUERCUS austriaca, 0° , 81, 102, 10° ? 9, 14° , 299; Q. Buergerii, 10° , (m) 18, 256; Q. cerris, -11° , 134, 9, 97; Q. c. var. Lucombeana,

§ See *Gard. Chron.* July, 1881, p. 178. There was great destruction among Lombardy Poplars in Somerset, Dorset, Wiltshire and Yorks, and also to a less extent near London, in Jan 1881.

33,(m)97, (m, "succirubra") 100,201; *uninj.*, -2°,101, 10°,39, 15°,53; *Q. c. var. variegata*, 0°?102; *Q. coccifera*, 208; *Q. coccinea*, 102; *Q. Concordia*, 33; *Q. crassifolia*, 208; *Q. Daimio*, 212; *Q. Fordii*, 9; *Q. glabra*, 3°,300, 5°,319, 11°,94, 63,119,176,178,280; *uninj.*, -2°,316, 2°,284, 3°,270, 53,94,208; *Obs.*, exposed, 94,280; *Q. Gramuntia*, 208; *Q. Ilex*, -10,304, -7°,142, -5°8,89; *uninj.*, -4°,42,99, -2°,112,267, -1°5,141, -1°,30, 0°,79,81,92,221,274; *vars. agrifolia &c.*, 208, (b. z.—0°) 10 (1), 14 (2), 6 (3), (1°—10°) 7 (1), 30 (2), 17 (3); *Obs.*, diff. ages, 125,267; exposed, 125; sheltered, 125; *uninj.*, -2°,316, 7°,125, 10°,48, 15°,53, 22†,44,59, 212, (b. z.—0°) 3, (1°—10°) 6, (11°—20°) 4; *Q. Mirbeckii*, 256; *Q. pseudococcifera*, -1°,30; *uninj.*, 208; *Q. Robur* (ОАК), -18°,130, -13°,129, -12°,131, -11°,134, -10°,113, -7°,99, -5°8, 89, -5°,110, 0°,274, 2°,100,101,273, 4°,214, 14,286; *uninj.*, -2°, 316, 3°,270, 22†,53,100,212,245,286; *var.*, Willow, 53; *Obs.*, acorns, 5,44; bark split, § -11°,134; exposed, 99; low, 130; sheltered, -7°,99, 7°,125; wet, 68; *Q. rugosa*, 256; *Q. Suber*, 0°, 274, 1°,31,233, 5,9,22*,200; *uninj.*, -2°,316, 3°,270, 15°,53, 149,210,212; *Q. Thomasii*, -1°,30.

RANUNCULUS, 239. RAPHIOLEPIS japonica, 63; *R. ovata*, -13°,129, 1°,304, 2°,32, 3°,241, 5°,29, 6°,303, 7°,125, 107,210,223,246; *uninj.*, 3°,271, 12°,123, 22†,210. RASPBERRY, 8°5,95, 12°,123; *uninj.*, 8°,113, 10°,84, 13; crop (1880), av. or fair, 160,168; good, 13,41,46,70,79,106,138,158; none (Rivers' perpetual),162.

REINECKIA, -1°,30. RETINOSPORA, (b. z.—0°) 2 (1), 3 (2), 1 (3), (1°—10°) 1 (1), 2 (2), 3 (3); *uninj.*, (b. z.—0°) 4, (1°—10°) 15, (11°—20°) 8; *R. ericoides*, -2°,267, 1°,31, 3°,160, 9°,213; *uninj.*, 22†,97,201,334; *R. filicoides*, 97; *R. juniperoides*, 1°,31; *uninj.*, 22†; *R. lycopodioides*, 79,102; *uninj.*, 22†; *R. obtusa*, 10°—5,60, 12°,192; *uninj.*, -2°,316, 6°,47, 7°,125, 20,97; *R. ob. aurea*, 6°,47; *R. pisifera*. *uninj.*, -2°,316, 6°,47, 15°,201, 20, 97; *R. pi.(m) alba spica*, -2°,267; *R. pi. aurea*, 5°,319, 21°,50; *uninj.*, 8°,151, 9°,213; *R. plumosa*, *uninj.*, 6°,47, 7°,125, 8°,151, 97, 201; *R. pl. argentea*, *uninj.*, 9°6,334; *R. pl. aurea*, 0°,135; *un-*

§ See a paper on *The Mechanical Injury to trees by cold*, by Prof. T. J. Burrill, *Bot. Gaz.*, vol. x., 1885, p. 334; quoted in *The Jl. Roy. Met. Soc.*, 1885, Ser. II., vol. v., pl. 6, p. 1029.

inj., 9° 6, 334, 97; *R. squarrosa*, 0°? 102; *uninj.*, 7°, 125, 97, 201.

RHAMNUS, 59; *R. Alaternus*, 1°, 140, 107; *uninj.*, 182; *R. alpinus*, 182; *R. Clusii*, 208; *R. hybridus*, 6°, (m) 47; *R. lanceolatus*, 208; (m) *R. utilis*, 208. *RHINOPETALUM*, 8°, 65. (m) *RHODOCISTUS Berthelotianus*, 17°, 178; *RHODODENDRON* (b. z.—0°) 12 (1), 13 (2), 9 (3), (1°—10°) 5 (1), 18 (2), 21 (3), (11°—20°) 1 (1), 3 (2), 6 (3); *uninj.*, (b. z.—0°) 3, (1°—10°) 10, (11°—20°) 10; *R. anthopogon*, 334; *R. arboreum*, 13°, 178, 238; *uninj.*, 9° 6, 334; *R. argenteum*, 213; *R. barbatum*, 13°, 178; *uninj.*, 214; *R. blandfordiæflorum*, 214; *R. blatteum* (m) -2°, 267; *R. calophyllum*, 213; *R. campylocarpum*, 214; *R. catawbiense*, -2°, 316; *R. cat. Everestianum*, -2°, 267; *R. celebrandum*, -2°, 267; *R. chamæcistus*, 9° 6, 334; *R. ciliatum*, 213; *uninj.*, 9° 6, 334, 183; *R. cinnabarinum*, 214; *R. Countess of Haddington*, 5°, 319; *R. dahuricum*, 214; *R. Edgeworthii*, 213; *R. Elfrida*, -2°, 267; *R. Falconeri*, 5°, 319, 13°, 178, 213; *R. ferrugineum*, 214, 334; *R. Fortunei*, 213; *R. glaucum*, 213; *R. hirsutum*, 214, 334; *R. John Spencer*, 201; *R. lepidotum*, 208, 214, 334; *R. maximum*, 213, (m) 214; *R. Mrs. Heneage*, 201; *R. niveum*, 213; *R. Nobleanum*, -5°, 323, 3°, 269; *R. ponticum*, -13°, 129, -11°, 134, -10°, 113, -5°, 323, -2°, 103, 112, 0°, 308, (*Obs.*) 337, 2°, 164, 4°, 128, 213; *uninj.*, (hybs.) 214; *R. præcox*, 13°, 178; *R. præ. superbum*, 3°, 269; *R. Queen of the West*, -2°, 267; *R. (scarlets)*, 8°, 335; *R. setosum*, 214; *R. (Sikkim)*, 2°, 322, 5°, 137, 213; *uninj.*, 10°, 202, 208, 214; *R. Smithii*, 3°, 199; *R. Thomsoni*, 213, 214; *R. triflorum*, 214; *R. Venus*, -2°, 267; *R. Victoria*, 201; *R. virgatum*, 208; *R. (Waterer's hybs.)*, 302; *R. Woolleri*, -2°, 267; *Obs.*, 9, 43, 122 (bis), 213, 214; flowers, few, 122, 130, 138, 163, 164, 165; flowers, late, 307; wood, unripened, 122. *RHODOTYPUS*, 182. *RHUBARB*, 43. *RHUS copallina*, 212; *R. Cotinus* and *vars.*, 102, 182; *R. glabra*, 5°, 222, 6°, 286; *uninj.*, 22†, 201, 238, 271; *R. gl. laciniata*, -13°, 295, 5°, 203, 6°, 47, 303, 21°, 50; *uninj.*, (m) 182; *R. japonica Osbeckii*, 212; *R. sylvestris*, 212; *R. typhina*, 2°, 216, 7°, 27, 12°, 148; *uninj.*, -13°, 295, 5°, 223, 3°, 271, 22†, 212. *RHYN-COSPERMUM*, 8, 10, 22*; *uninj.*, 64.

RICHARDIA æthiopica, 8, 51; *uninj.*, 6°, 303, 13°, (m) 22; *R. albo-maculata*, *uninj.*, 8°, 65, 16°, 64; *R. melanoleuca*, 8°, 65. *RIBES*, 5°, 204; *uninj.*, 3°, 271, 4°, 215, 5°, 203, 9°, 209, 59, 201; *R. alpinum*, 295; *R. aureum*, (m) 182, 245; *R. aur. præcox*, 295; *R. fuchsoides*, 19; *R. missouriense*, 295; *R. nigrum*, *varieg.*, 295; *R. pen-*

dulum, 295; *R. rubrum*, 245; *R. sanguineum*, **-18°**, 130, **-11°**, (m) 134; *uninj.*, **9°**, (m) 291, (m) 182, 334; *R. sang. fl. pl.*, 295; *R. serotinum*, 295; *R. speciosum*, **-13°**, 295, **-1°**, 30, **5°**, 222, 208; *uninj.*, 182.

ROBINIA hispida, 56; *R. Pseud-Acacia*, **1°**, 140, **5°**, 137, **7°**, 27; *R. pyramidalis*, **13°**, 178; *R. umbraculifera*, **6°**, 47. *RODGERSIA*, 63, 243. *ROMANZOFFIA*, **8°**, 65. *ROSEMARY*, (b. z.—**0°**) 15 (1), 5 (2), 1 (3), (**1°—10°**) 22 (1), 12 (2), 3 (3); *uninj.*, (b. z.—**0°**) 3, (**1°—10°**) 3, (**11°—20°**) 3. *ROSES* § (Dwfs.), (b. z.—**0°**) 10 (1), 14 (2), 5 (3), (**1°—10°**) 4 (1), 10 (2), 13 (3), (**11°—20°**) 3 (1), 2 (2), 3 (3); *uninj.*, (b. z.—**0°**) 2, (**1°—10°**) 6, (**11°—20°**) 3; (H. P.'s) (b. z.—**0°**) 6 (1), 19 (2), 1 (3), (**1°—10°**) 14 (1), 19 (2), 14 (3), (**11°—20°**) 1 (1), 5 (2), 2 (3); *uninj.*, (b. z.—**0°**) 0, (**1°—10°**) 5, (**11°—20°**) 3; (Standards), (b. z.—**0°**) 31 (1), 17 (2), 1 (3), (**1°—10°**) 25 (1), 24 (2), 12 (3), (**11°—20°**) 6 (1), 1 (2), 1 (3); *uninj.*, (b. z.—**0°**) 0, (**1°—10°**) 3, (**11°—20°**) 1; (Tea) (b. z.—**0°**) 14 (1), 8 (2), 0 (3), (**1°—10°**) 29 (1), 24 (2), 6 (3), (**11°—20°**) 6 (1), 1 (2), 1 (3); *uninj.*, (b. z.—**0°**) 0, (**1°—10°**) 5, (**11°—20°**) 4; (sorts) (b. z.—**0°**), 8 (1), 8 (2), 3 (3), (**1°—10°**) 21 (1), 31 (2), 10 (3), (**11°—20°**) 9 (1), 10 (2), 9 (3); (sp. and vars.), A. K. Williams, 124; A. de Diesbach, 331; Archiduchesse, 331; Alfred Colomb, 280; Annie Laxton, 66; Ayrshire, fl. pl., **2°**, 100, **7°**, 165; Banksian, **0°**, 37, **2°**, 141, **4°**, 217, **5°**, 137, **6°**, 4, 22, 183, 208, 220; *uninj.*, **15°**, 56, yellow, 334; B. Gonella, 331; Baroness Rothschild, 194, 280, 331; *uninj.*, **-3°**, 26, 33; Beauty of Waltham, 331; Belle Lyonnaise, **-3°**, 26, **2°**, 32; Bessie Johnson, 331; Blanche d'hiver, 93; Boule d'or, 331; Bouquet d'or, **-3°**, 26, **4°**, 67; Bourbon, **4°**, 73, **7°**, 165; *R. bracteata*, **18°**, 63, 208; *uninj.*, **15°**, 56; Brunonis, (m) 208, 220; Calville, 93; Capt. Christy, 280; Cardinal Wolsey, 66; Catherine Mermet, **-3°**, 26; Céline Forestier, **-3°**, 26, 182, 194; *uninj.*, **3°**, 199; Ch. Forestier, 331; Ch. Lawson, 331; Ch. Lefebvre, 280; Ch. Margottin, 331; C. Verdier, 331; China, **4°**, 73, **5°**, 137, **9°**, 77, 156, 95, 187; Cloth of Gold, **-3°**, 26, 257, 331; Comte de Paris, 331; Comtesse de Chabillante, 331; Countess of Oxford, 331; Countess of Roseberry, 124; Cristata, **-3°**, 266; Devoniensis, **-5°**, 8, 89, **0°**, 37, **2°**, 32, **4°**, 73, 194; *uninj.*, 81, 171; Dog, **-3°**, 26, 17; Dr.

Hooker, 66; Duchess of Bedford, 124; Duke of Edinburgh, 194; *uninj.*, 9° , 291; Duke of Wellington, 331; Dundee Rambler, -18° , 130; Ed. Morren, 331; *uninj.*, -3° , 26; Ed. Verdier, 331; Elie Morel, 66; Eliza Boll, 194; Emily Laxton, 26; Etienne Levet, 280; Fortune's White, 26; Fortune's Yellow, 26; François Michelin, 280; Gén. Jacqueminot, 280, 331; Gloire de Dijon, -18° , 130, -12° , 131, -5° 8, 89, -3° , 26, -0° 5, 87, 0° , 83, 2° , 32, 167, 322, 9° , 77, 171, 47, 67, 262, 331; *uninj.*, -7° , 315, -3° 5, 313, -1° 5, 141, 2° , 322, 3° , 262, 5° , 32, 9° , 291, 47, 110, 171, 183; Homère, -3° , 26; Horace Vernet, 280; R. indica, 194; Jaune Desprez, 2° , 100; Jean Ducher, 2° , 32; Jean Lambert, 66; John Hopper, 280; *uninj.*, -3° , 26, 9° , 291; Jules Margottin, -3° , (m) 26, 194; La France, 194, 280, 331; Lamarque, 2° , 32; La Reine, 2° , 32; Louis Van Houtte, 280; Macartney, 0° , 37, 42, 185, 208; R. macrocarpa, 208; Madame Bérard, -3° , 26; Mad. de Vatry, -3° , 26; Mad. Ducher, (m) 331; Mad. Falcot, 67; Mad. H. Jamain, -3° , (m) 26, 331; Mad. Lacharme, 194; Mad. Loine Giesson, 66; Mad. Margottin, -3° , 26, 2° , 32; Mad. V. Verdier, 331; M. Willermoz, 2° , 32, (m) 182; Magnolia, 183; Maréchal Bugeaud, -3° , 26; Maréchal Niel, -3° , 26, 249, 0° , 38, 83, 2° , 32, 5° , 137, 7° 33, 2, 34, 47, 182, 257, 271; *uninj.*, 3° , 199, 5° 2, 32, 15° , 56, 18° , 183, 47, 56, 110; Marie Baumann, 194, 280; Marie Guillot, -3° , 26; Marie van Houtte, -3° , 26, 2° , 32; Marquise de Castellaine, 280; R. microphylla, 208; R. moschata (moss), -1° 5, 141, 220; Mrs. Baker, 67; Niphetos, -3° , 26, 0° , 83; Noisette, 2° , 100, 160, 4° , 73; R. rubiginosa, -4° , 99; Ruga, 2° , 100; Pierre Notting, 194; President, 182; Rève d'or, -5° 8, 89, 0° , 83, 67; R. Hole, (m) 331; R. rugosa, 10° , 19, 208; Sénateur Vaisse, 280; R. sericea, 220; Solfaterre, 182, 183; Souvenir d'Elise, -3° , 26; Souvenir de la Malmaison, -3° , 26, 194; Souvenir de Paul Neyron, -3° , 26; Souvenir d'un ami, -3° , 26; Souvenir de V. Verdier, 124; Summer, -3° , 26; Triomphe de Rennes, -3° , 26, 3° , 199, 182; Victor Verdier, 2° , 32; Village Maid, -3° , 26; Xavier Olibo, 194. *Obs.*, Ages, 258, 262; Alt., 79, 80. Briars, 26, 83, 182. Named Stocks, 53, 72, 79, 82, 89, 90, 166, 199, 239. Climbing, 81, 165. Light soil, 15. Frost, *Obs.* on effects of, 15, 26, 47, 52, 67, 103, 127, 216, 251, 252, 255; on Dwfs., 15, 66, 133; on H. P.'s, 26; on Teas, 22, 52, 67; Pith black, 26, 52; Snow and water, 81; Wood, strong, 167; unripened, 157.

RUBUS (see BLACKBERRY); R. australis, 16° , 63, 31° , 149; *uninj.*, 18° , 10; R. biflorus, 19; R. deliciosus, 19; R. rosæfolius, 19,

63. *RUDBECKIA atrosanguinea*, 181; *R. pulcherrima*, 181; *R. purpurea*, 243. *RTA* (Rue), -7° , 99, 194. *RUSCUS aculeatus*, -18° , 130, -10° , 113, -1° , 46, 2° , 284, 3° , 244, 5° , 203, 222, 6° , 303, 10° , 185, 187; *uningj.*, -9° , 232, 3° , 271, 4° , 215, 7° , 245, 22†, 212, 233, 250; *R. racemosus*, 5° , 137.

SALISBURIA (GINGKO), -13° , 295, -5° , 8, 89, -4° , 278, 13° , 95, 107, 119; *uningj.*, (b. z.— 0°) 2, (1° — 10°) 14, (11° — 20°) 5; *Do. variegata*, -13° , 295. *SALIX babylonica* (Weeping WILLOW), 107, 123. *SALSIFY*, (m) 44. *SALVIA fulgens*, -1° , 5, 141; *S. Marshalli*, -1° , 5, 141; *S. officinalis* (Sage), 4° , 35, 8° , 113, 53, 122, 187; *S. patens*, 15° , 176; *uningj.*, 7, 183. *SAMBUCUS nigra* (ELDER), *var. aurea*, 182; *S. racemosa*, 5° , 137. *SANTOLINA chamaecyparissus*, -13° , 129, -4° , 278, -1° , 285, 1° , 220, 1° , 5, 107, 2° , 216, 5° , 231; *uningj.*, 3° , 271, 9° , 6, 334, 22†, 212, (b. z.— 0°) 4, (1° — 10°) 8; *S. ch. incana*, -6° , 89. *SARRACENIA Drummondii*, 183, 334; *S. D. alba*, 334; *S. flava*, 334; *S. purpurea*, 334. *SAUROMATUM*, 64. *SAXEGOTHEA*, 211. *SAXIFRAGA*, 12; *S. Fortunei*, 334; *S. japonica*, 334; *S. purpurascens*, 5° , 203; *uningj.*, 7° , 12; *S. sarmentosa*, 42; *uningj.*, 183, 334.

SCHIZANDRA, 208. *SCHIZOPHRAGMA*, 8° , 66; *uningj.*, 10° , 19. *SCHIZOSTYLIS*, 5° , 80, 7° , 33, 15° , 176, 16° , 181. *SCIADOPITYS*, 19. *SCILLA campanulata*, 2° , 243; *S. undulata*, 18° , 10.

SEAFORTHIA, 5° , 204, 51. *SEDUM carneum*, 183; *S. Sieboldii*, 194; *uningj.*, 12° , 123. *SELAGINELLA denticulata*, *uningj.*, 4° , 35, 12° , 123; *S. Kraussiana*, *uningj.*, -1° , 30, 6° , 303. *SENECIO argenteus*, 13° , 178; *S. macroglossus*, 13° , 178; *S. mikanioides*, 183; *S. pulcher*, 5° , 203, 210; *uningj.*, 7° , 22, 8° , 65, 16° , 64. *SEQUOIA* (WELLINGTONIA) *gigantea*, (b. z.— 0°) 9 (1), 18 (2), 14 (3), (1° — 10°) 13 (1), 13 (2), 20 (3); *uningj.*, (b. z.— 0°) 8, (1° — 10°) 9, (11° — 20°) 9; *Obs. on.*, -11° , 90; *S. (TAXODIUM) sempervirens*, -7° , 99, -4° , 99, -2° , 267, 0° , 92, 102, 249, 274, (b. z.— 0°) 2 (1), 4 (2), 2 (3), (1° — 10°) 1 (1), 5 (2), 5 (3); *uningj.*, 0° , 156, 3° , 271, 5° , 223, 22†, 109; *S. semp. alba spica*, 73, 246.

SHEPHERDIA argentea, *uningj.*, 16° , 182. *SIDALCEA*, 2° , 243. *SILENE*, 54. *SISYRINCHIUM*, 63.

SKIMMIA (b. z.— 0°) 1 (1), 1 (2), 1 (3), (1° — 10°) 1 (1), 4 (2), 5 (3); *uningj.*, (b. z.— 0°) 3, (1° — 10°) 7, (11° — 20°) 6.

SMILAX aspera, 13° , 178; *S. ovata*, -1° , 30.

SOLANUM, 58; *S. azureum*, 178; *S. glaucophyllum*, 63; *S. jas-*

minoides, **8°**,65, **12°**,117, 63,181,208. SOLARIA, **8°**,65. SOPHORA japonica, **5°**,137, **10°**,16, 132; *Obs.*, 16; S. pendula, 187. SOUTHERNWOOD, **-4°**,99.

SPARAXIS, **0°**,82, **8°**,65, **18°**,10. SPARTIUM, **-13°**,295, **-1°**,30, (**1°—10°**) 3 (1), 4 (2), 4 (3); *uningj.*, (b. z.—**0°**) 1, (**1°—10°**) 3, (**11°—20°**) 2. SPINACH, **1°**,106, **5°**,150, 38,46,122; *uningj.*, **-1°**5,142, 59. SPIRÆA, **-13°**,295; *uningj.*, **10°**,19; S. ariæfolia, 182; S. bella, 182; S. callosa, 182; S. cantoniensis, 60; S. Douglasii, 182; S. lævigata, 182; S. Lindleyana, **5°**,137,203; *uningj.*, **10°**,232, **16°**,182; S. palmata, **2°**243; S. prunifolia, **5°**,137; S. Reevesiana, **5°**,137; Thunbergii, **5°**,137,182; S. trilobata, 182; S. ulmifolia, 182. SPRUCES, 80.

STACHYS, 181. STAPHYLEA, 202. STATICE latifolia, 122,123. STAUNTONIA hexaphylla, **10°**,18; S. latifolia, **7°**,12, **10°**,18, **11°**,94, **15°**,21, 246; *uningj.*, 202. STEWARTIA, **10°**,18. STOCKS, **-9°**,232, **0°**,274, **3°**,241,269, **4°**,214, **5°**,203,204,220, 55,122, 224; *uningj.*, 201. STOBÆA, 210. STOKESIA, **8°**,65, **16°**,63. STRAWBERRY, (b. z.—**0°**) 2 (1), 6 (2), 8 (3), (**1°—10°**) 4 (1), 5 (2), 12 (3); *uningj.*, (b. z.—**0°**) 3, (**1°—10°**) 7, (**11°—20°**) 4; vars., British Queen, 226; Carolina, 242; Dr. Hogg, **3°**,226, **5°**,319, **7°**,152, 242; Eleanor, 209,242; Eliza (seedling), 209,242; Frogmore Late Pine, 269; Garibaldi, 319; Green's scarlet, 313; Grosseur sucrée, 269; Helena Gloede, 313; J. Veitch, 313; Keen's seedling, **3°**,226, **5°**,319, 197; Loxford Hall, 313; Lucas, 313; Maréchal McMahon, 152; Pioneer, 313; President, **3°**,226, **5°**,319, 197; *uningj.*, **-6°**,313, **9°**,209, 242; Sir Ch. Napier, 242; Sir J. Paxton, **5°**,319; *uningj.*, **9°**,209; Vicomtesse Héricart de Thury, **0°**(m)82, **3°**(m)269, **5°**,319; *uningj.*, **9°**,209, 242; Wizard of the North, 319; *Obs.*, crop 1880, av. or fair, 46,138; deficient, 92; good, 13,14,35,41,48,70,79,106,166,189; situation exposed, 92,138; wind. effects of, 127. STYRAX, **8°**,65,208; *uningj.*, **10°**,19.

SWAMMERDAMIA, 63. SWERTIA, **8°**,65.

SYMPLOCOS, 208, SYRINGA (Lilac), **6°**,47, 13; *uningj.*, **10°**,19, 59.

TAGETES, 181. TAMARIX, **-5°**8,89, **10°**,145, 107. TAXACEÆ, 159. TAXODIUM distichum, **-13°**,295, **-10°**,304, **-6°**,329, **0°**,102,221,228, **3°**,166,269, **5°**,222, **6°**,286,303, **13°**,5, **15°**(m)176; *uningj.*, **9°**,213, **12°**,238, **14°**,54, **15°**,201, 7,22†; T. mexicanum, **4°**,73; T. sempervirens (*see* SEQUOIA).

TECOMA amabilis, 63; *T. grandiflora*, 63; *T. radicans*, 210. *TECOPHILÆA*, (*m*) 65. *TEUCRIUM* Arduini, 28; *T. aureum*, 30; *T. fruticans*, 63.

THAMNOCALAMUS Falconeri, (*m*) 176, 22. *THAMNOPTERIS*, 149. *THEA* Bohea, 50; *T. viridis*, 1°, 140, 63. *THUJA*, -11°, 134, -10°, 304, -1°, 154, 2°, 179, 3°, 107, 8°, 155, 54, 246; *uninj.*, 97, 111, 179; *Obs.* on, 250; *T. (see BIOTA)* aurea, -5° 8, 89; *T. gigantea*, 201; *uninj.*, -5° 8, 89, 8°, 151, 22†, 109, 286; *T. Lobbii*, -11°, 134, 17; *uninj.*, 10°, 39, 15°, 56; *T. occidentalis* aurea, 56; *T. sempervirens*, 35; *T. sibirica*, 39; *T. Vervæneana*, 246, (*m*) 286. *THUJOPSIS* borealis (*CUPRESSUS* Nutkaensis), -1°, 46, 5°, 203; *uninj.*, -5° 8, 89, 3°, 72, 4°, 35, 10°, 39, 13°, 69, 97; *T. dolabrata*, *uninj.*, -1°, 30, 4°, 35, 6°, 47, 8°, 55, 17, 22†, 97, 286; *T. lætevirens*, 6°, 47, 60; *uninj.*, 6°, 47; *T. Standishii*, 6°, 47. *THYME*, -10, 113, 0°, 82, 4°, 35, 10°, 7, 16°, 187, 17°, 11, 21°, 53.

TODEA, 31°, 149. *TOMATO*, 0°, 38. *TORREYA*, 107.

TRACHELOSPERMUM, 10°, 202. *TRICHONEMA*, 28. *TRILLIUM*, 2°, 243. *TRIPSACUM*, 63. *TRISTANIA*, 63. *TRITOMA* (*KNIPHOPHIA*) aurea, 63, 181; *uninj.*, 18°, 10; *T. caulescens*, 10, 210; *T. MacOweni*, 10; *T. pumila*, 334; *T. Uvaria*, (*b. z.*—0°) 10 (1), 3 (2), 3 (3), (1°—10°) 13 (1), 14 (2), 7 (3), (11°—20°) 2 (1), 4 (2); *uninj.*, (1°—10°) 6, (11°—20°) 7. *TROCHOSTIGMA*, 210. *TROPEOLUM*, 65.

TULIPS, *uninj.*, 8°, 65.

ULEX europæus (*see* *FURZE*); *U. strictus*, 178. *ULMUS* (*see* *ELM*); *U. stricta*, 272.

VACCINIUM, 208. *VALERIANA*, 2°, 243. *VALLOTA*, 15°, 53, 18° (*m*), 10. *VEGETABLES*, § -12°, 131, 142, -7°, 99, 4°, 128, 163, 8°, 37, 6°, 111, 5°, 121, 250, 251, 268; *uninj.*, -7°, 142. -1° 5, 142, 2°, 141, 5°, 138, 7°, 125, 9°, 74, 108, 121; growth, peculiar, 81; seeds not matured, 52; snow, protection by, -5°, 135; wet, effects of, 1, 6, 13, 52, 58, 80, 91, 111, 148, 151, 166; winds, effect of, 121.

VELLA, 10°, 18; *uninj.*, 16°, 64. *VERBENA*, 108. *VERONICA*, 10°, 145, 185, 12°, 2, 117, 8, 11, 28, 54, 73, 95, 121, 122, 179, 190; *uninj.*, 4°, 217, 109; *V. Andersoni*, -2°, 301, -1°, 285, 0°, 274, 302, 1°, 140, 3° 199, 241, 269, 4°, 198, 5°, 204, 6°, 303, (*b. z.*—0°) 9 (1), 1 (2),

1 (3), (**1°—10°**) 18 (1), 2 (2), 3 (3), (**11°—20°**) 8 (1), 5 (2), 2 (3); *uninj.*, (**1°—10°**) 3, (**11°—20°**) 1; *V. angustifolia*, 182; *V. carnosula*, 208; *V. decussata*, 63; *uninj.*, **10°**, 19; *V. devoniensis*, **8°**, 65; *uninj.*, **8°**, 65; *V. Hulkeana*, (*m*) 334; *V. pingui-folia*, **8°**, 65, 63, 208; *uninj.*, **8°**, 65, **10°**, 19, 208; *V. salicifolia*, **-4°**, 278, **-2°**, 301, **1°**, 140, **3°**, 199, 241, **4°**, 214, **5°**, 222, **6°**, 199, 303, (*b. z.—0°*) 6 (1), 1 (2), (**1°—10°**) 14 (1), 2 (2), 2 (3), (**11°—20°**) 3 (1), 3 (2); *uninj.*, **3°**, 271, **13°**, 22, **16°**, 182, 118; *V. speciosa*, 55; *V. Traversi*, **-2°**, 301, **1°**, 140, **3°**, 269, **8°**, 65, **10°—5°**, 60, **12°**, 239, **15°**, 200, 187, 208, 211, 220; *uninj.*, 22†, 65, 202, 210.

VIBURNUM Awafurki, 246; *uninj.*, **15°**, 56; *V. macrocephalum*, 60; *V. lucidum*, 22; *V. Opulus*, 38; *V. plicatum*, *uninj.*, **5°**, 203, **10°**, 19; *V. Sieboldi* (see LAURUSTINUS), 176. *VINCA*, **-14°**, 42, 12, 33. *VIOLA* gracilis, 28; *V. Munbyana*, 10; *V. odorata* (VIOLET), **5°**, 319, **8°—5°**, 95, 13, 122; *V. Rothomagensis*, 28. *VIRGILIA*, 182. *VITEX* incisa, *uninj.*, **1°**, 30, 63; *V. agnus-castus*, **-1°**, 30, 208. *VITIS* heterophylla, 63, 102; *V. vinifera* (VINE), **-13°**, 129, **3°**, 199, **12°**, 123, **17°**, 11, 46, 22†, 284; *vars.* Black cluster, 270; *Hamburgh*, 201, 270; *Muscadine*, 270; *Purple-leaved*, 80; *Sweet-water*, **9°**, 209, **15°**, 201. *VITTADINIA* triloba (*ERIGERON mucronatum*), *uninj.*, **9°—6°**, (*m*) 334, **18°—6°**, 183.

WALLFLOWER, (*b. z.—0°*) 15 (1), 7 (2), 3 (3), (**1°—10°**) 14 (1), 24 (2), 11 (3); *uninj.*, (*b. z.—0°*) 2, (**1°—10°**) 8, (**11°—20°**) 5; *Obs.*, great inj., 43. *WALNUT* (JUGLANS), **-13°**, 129, 295, **-10°**, 113, **-5°—8°**, 89, **0°**, 81, **5°**, 137, 5, 45, 46; *uninj.*, **10°**, 84, 22†, 212; *Obs.*, buds killed, 209; fruit, none, 197; stem split, 292. *WATSONIA*, 65.

WEIGELA alba, 89; *W. rosea*, **-18°**, 130, **-13°**, 295, **-1°**, 285, **2°**, 216, **5°**, 203, 204, **6°**, 199; *uninj.*, **-13°**, 295, **-2°**, 316, **2°**, 284, **3°**, 271, **4°**, 215, **5°**, 223, **7°**, 245, **9°**, 209, 213, 22†, 182, 201, 212.

WHEAT, **-4°**, 42, **8°**, 65, 251.

WIDDRINGTONIA, 246, *WISTARIA*, **-18°**, 130, **-10°**, 304, **-8°**, 300, **-5°—8°**, 89, **-4°**, 99, **-2°**, 267, **0°**, 102, 228, 274, **1°**, 304, **2°**, 284, **3°**, 199, 267, (*b. z.—0°*) 1 (1), 4 (2), 4 (3), (**1°—10°**) 3 (1), 6 (3), 3 (3); *uninj.*, (*b. z.—0°*) 2, (**1°—10°**) 12, (**11°—20°**) 9.

WOODWARDIA radicans, **16°—4°**, 63.

XANTHOCERAS, 246; *uninj.*, **10°**, 19, 64, 202. *XANTHOXYLON*

alatum, 2; X. Bungei, 208; X. planispinum, 211; X. schinifolium, 212.

XIPHION, several sp., 8°, 65.

YEW (*TAXUS baccata*), (b. z.—0°) 8 (1), 13 (2), 15 (3), (1°—10°) 3 (1), 7 (2), 14 (3); *uningj.*, (b. z.—0°) 8, (1°—10°) 11, (11°—20°) 7; *Obs.*, soil, dry and wet, 82; *var.* Irish, (b. z.—0°) 3 (1), 1 (2), 4 (3), (1°—10°) 1 (2), 4 (3); *uningj.*, (b. z.—0°) 3, (1°—10°) 7, (11°—20°) 10; *vars.*, -10°, 308; soil, dry, 82; wet, 16, 34, 82.

YUCCA, 0°, 38, 1°, 35, 2°, 32, 8°, 124; Y. aloifolia, -10°, 304, 0°, 274, 302, 2°, 216, 3°, 199, 241, 4°, 198, 2, 63, 199, 211; *uningj.*, -1°, 30, 2°, 284, 3°, 271, 9°, 209, 213, 12°, 238; Y. angustifolia, 63; Y. baccata, 18; Y. filamentosa, 1°, 304, 3°, 199, 4°, 214, 5°, 80, 6°, 303, 9°, 266, 16°, 181, 187, 18, 63, 211; *uningj.*, 2°, 217, 3°, 271, 5°, 223, 22†, 118, 201, 238; Y. flaccida, 286; Y. gloriosa, 3°, 199, 6°, 303, 10°, 18, 12°, 123, 15°, 176, 211; *uningj.*, 2°, 217, 3°, 271, 5°, 223, 10°, 7, 12°, 123, 238, 15°, 56, 118, 201, 210; Y. recurva, 4°, 73, 5°, 319, 15°, 55, 16°, (m) 181, 187; *uningj.*, 15°, 56; Y. rupicola, 10, 18; Y. stenophylla, -1°, 41; Y. Whipplei, 63, 178.

ZAUSCHNERIA, 4°, (m) 35, 5°, 159; *uningj.*, 18° 6, 183.

ZEPHYRANTHES, 16°, 181. ZENOBIA floribunda, 19; Z. speciosa, 10°, 19, 210.

ZIZYPHUS sativus, 107.

INDEX TO SPECIES, VARIETIES AND INDIVIDUALS
SHOWING DIFFERENT DEGREES OF INJURY AND
HARDINESS (*See also* INDEX TO PLANTS).

ABELIA, 211. ABIES, 39,102,109,203,211,253§-254,284,315. ACACIA, 202. ACER, 100,255-256. ALOYSIA, 183. ALTHÆA, 16-17. AMPELOPSIS, 129,135,136,203,208-209,294-295. ANDROMEDA, 18. APPLE, 60,67,84,110,111,151. APRICOT, 294. ARALIA, 51,123, 181,206-208,294,332. ARAUCARIA, 10-11. ARBUTUS, 18-19, 22*, 56,74, 206 208,210,211-212,223,292. ARISTOLOCHIA, 18-19,62-63. ARISTOLELIA, 206-208. ARTICHOKE (globe), 108. ARUNDO, 22,123, 332,334. AUCUBA, 95,101,166,214-215,254,281,336. AZALEA, 213-214,311.

BAMBUSA, 62:63,318. BELLIS, 18-19. BERBERIS, 18-19,83, 89,100,102,125,129(bis.),166,203,207,212,214-215,216,222,256, 266,267,299,304-305,308,310,315,334. BIOTA (see THUJA), 17,60. BROCCOLI, 52,54,80,135,141,190,203,228,241,252,261,262,269,271, 275,313. BRUSSELS SPROUTS, 222. BUDDLEA, 18-19.

CABBAGE, 43,135,162,222. CAMELLIA, 57. CARNATION, 202. CARYA, 100. CASTANEA, 294-295. CATALPA, 216,222,294. CEA-
NOTHUS, 60,68,200,211-212,269-270,321. CEDRUS, 31(bis.),73,89, 90,125,198,203,211-212,222,223,257,263,266,269-270,272,274,277, 278,283,284,294,303,304(bis.),308,324. CELERY, 323. CHAMÆ-
ROPS, 18-19. CHERRY, 52,141,226. CISTUS, 18-19,64-65,210. CLEMATIS, 38,137,194,271,285,294-295,315-316. COLLETIA, 241. COLUTEA, 294-295. CONIFERÆ, 39,78,250,305,333. CORDYLINE, 178. COTONEASTER, 329. CRYPTOMERIA, 89,97,135,166,274,278, 283,302. CUPRESSUS, 17,27,30,31,47,78,100,180,205,213,222,240, 253,254,263,277,283,284,285,294-295,299,303,315,327,329,332. CUR-
BANT, 79,128. CYTISUS, 73,78,84

§ Numbers joined by hyphens signify the same Report.

DAHLIA, 13, 183, 333-334. DAPHNE, 18-19, 180, 211-212, 294-295.
DEUTZIA, 213. DICKSONIA, 149.

EDWARDSIA, 64-65. ERICA, 139, 190, 207, 333-334. ESCALLONIA,
202, 205, 211-212, 216, 222, 223, 252, 269, 270, 292, 299, 312, 318, 321 (bis),
326, 327, 332. EUCALYPTUS, 149, 180, 202, 207-208. EUGENIA, 50.
EUSYMYUS, 7, 45, 81, 98, 102, 209, 214-215, 222, 256, 259, 260, 269, 270,
278, 293, 303, 312, 315-316, 321, 332. EURYBIA, 18-19.

FORSYTHIA, 294. FUCHSIA, 18-19, 58, 60, 63, 64-65, 198, 292, 299,
313, 333-334. FURZE, 214-215.

GARRYA, 34. GEUM (*m* "Greens"), 113.

HEDERA, 207. HOLLY, 45, 88, 110, 143, 227, 263, 310. HYDRAN-
GEA, 30, 222, 269-270, 286, 292, 303. HYPERICUM, 56, 198.

ILEX, 207-208. ILICUM, 18-19, 211-212. IRIS, 203, 210. IVY,
45, 77, 89, 110, 198, 259.

JASMINUM, 89, 187, 198, 232, 258, 262, 273, 307. JUNIPERUS, 39, 78,
97, 191, 250, 295.

KALE, 7, 99, 305. KNIPHOFIA, 18-19, 63.

LAUREL, COMMON, vars., 17, 73, 78, 84, 89, 102, 209, 221, 222, 249, 263,
269-270, 281, 290, 292, 305, 312. LAUREL, sp., 30, 37, 38, 39, 48, 67, 78,
81, 83, 84, 85, 87, 89, 93, 98, 99, 119, 198, 203, 204, 209, 220, 221, 234, 248,
263, 272, 273, 287, 290, 292, 304, 305, 311, 316, 319, 323, 329 (bis), 335.
LAURUS, 202. LAURUSTINUS, 179. LEPTOSPERMUM, 318. LET-
TUCE, 321. LIBOCEDRUS, 295. LIGUSTRUM, 102, 200, 207, 285. LI-
LIUM, 65, 213, 281. LONICERA, 203, 285, 295.

MAGNOLIA, 203, 207-208, 211-212, 269, 326. MAHONIA, 65. MO-
RUS, 137.

NECTARINE, 226.

OLEA, 18-19. OSMANTHUS, 47.

PAMPAS GRASS, 6. PEACHES, 33, 130, 226, 267. PEARS, 110, 151.
PERNETTYA, 295. PICEA, 22*-22†, 31, 35, 39, 73, 79, 89, 119, 166, 205,
214-215, 254, 256, 263, 267, 278, 284, 285, 286, 294, 295, 303, 316, 327. PI-
NUS, 22*-22†, 31, 39, 78, 109, 192, 200-201, 204, 214-215, 233, 254, 284,
295, 303, 316, 332. PISTACIA, 63. PITTOSPORUM, 50. PLANE, 71.
PLUM, 226. POPLAR, 246.

QUERCUS, 33, 39, 88, 97, 100, 102, 200-201, 203, 208, 256, 258, 259, 269,
270, 312, 332.

RHODODENDRON, 112, 133, 151, 178, 202, 208, 213-214, 238, 292, 294,
315, 316, 319. ROBINIA, 27. ROSE, 32, 37, 73, 77, 83, 89, 93, 110, 119, 137,
141, 182, 183, 194, 208, 250, 281, 284.

SEQUOIA, 39,89,99,205,258,285,335. SPIRÆA, 137. STRAWBERRY, 82,226,242,313.
 TAXODIUM, 73,166. THUJA, 250. TODEA, 149.
 VERONICA, 8,28,54,65,122,202,208,269-271,302,323,332-333.
 WEIGELA, 295.
 YEW 263. YUCCA, 216-217,303,321.

INDEX TO MISCELLANEOUS MATTERS.

AGE, relative effects of. ALTHÆA, 16-17. APPLE, 46,93,95,190, 336. APRICOT, 68,80,266,278. ARBUTUS, 21. BERBERIS, 256. CABBAGE, 141. CEDRUS, 16,89,258,322. CLEMATIS, 95. CUPRESSUS, 17. EUONYMUS, 44. FOREST TREES, 86. FRUIT TREES, 6. FUCHSIA, 241. FURZE, 125. HOLLY, 110,258. IVY, 110,258. LARCH, 7,125. LAUREL BAY, 29. LAUREL, common, 34,73,258. LETTUCE, 141. MULBERRY, 42. NECTARINE, 41. PEACH, 41,270. PINUS insignis, 29,256. QUERCUS glabra, 94. Q. Ilex, 29,125,267. ROSE, 258. (Gloire de Dijon) 262. SEQUOIA, 89,90. SOPHORA, 16. STRAWBERRY, 313.

ALTITUDE, *Obs.* on effects of, 25,28,34,36,43,77,79-80,210,82,117, 210,311,313,323. Frost in valleys (*see* p. viii.), 34,308. Temps. at different alts., 294. Plants inj. or uninj. at different alts., 74,109, 117,134. ARAUCARIA, 82,323. AUCUBA, 82,117. AZARA, 82. BROOM, 110. CAMELLIA, 14. CEANOTHUS, 36. CEDRUS Deodara, 14-15,34,73,82,322. COLLETIA, 176. CUPRESSUS, 14,323. DEUTZIA, 34. ESCALLONIA, 36. EUONYMUS, 118. FIGS, 11. FUCHSIA, 165. HOLLY, 25. LAUREL Bay, 26,42,82. LAUREL, Common, 36, 42,43,44. L., Portugal, 112. LAURUSTINUS, 32,36,165,269. MULBERRY, 45. OAK, 130. PAMPAS GRASS, 36,45. PINUS insignis, 109. QUERCUS glabra, 94. ROSES, 292; R. Gloire de Dijon, 322; R. TEA, 36. RHODODENDRON, 323. SEQUOIA gigantea, 39,259. YEW, 34.

CLIMATE, (*see* METEOROLOGICAL OBSERVATIONS for each County respectively, under INDEX TO COUNTIES).

DRAINAGE, 28, 39, 74, 190.

INJURY, delayed appearance of, and *Obs.* on, &c. FRUIT TREES, 46. FURZE, fl. pl., 16. LAUREL, Portugal, 87. POPLAR, 37. ROSES, 16, 26, 124.

SEA, *Obs.* on proximity to, 8, 15, 108, 111, 118, 120, 124-125, 148, 151, 152, 173, 286.

SITUATIONS, *Obs.* on, *dry*, 27, 28, 36, 58, 82, 92, 100-101, 112, 117-118; *exposed*, 22, 25, 138, 152; APRICOT, 11. BOX, 99. BROOM, 110. CEANOTHUS, 22. CHOISYA, 210. CONIFERS, 39, 79, 80, 121, 125. CYTISUS, 130. ERYTHRINA, 11. EVERGREENS, 74, 82, 99, 117, 125, 131, 141. FIGS, 11. GARRYA, 74. HOLLY, 79. LAUREL, Bay, 74. LAUREL, common, 93. LAURUSTINUS, 11, 74. PHOTINIA, 210. RAPHIOLEPIS, 210. VEGETABLES, 121. VERONICA, 210: *low*, ARBUTUS, 74. BROOM, 136. CAMELLIA, 14. CUPRESSUS, 14. EVERGREENS &c., 134. OAK, 130. PHILESIA, 74: *sheltered*, ARBUTUS, 141, 154. CEDRUS, 92, 95. CEPHALOTAXUS, 280. CHAMÆROPS, 20. ELM, 99. HOLLY, 77, 78, 131. IVY, 99. LAUREL, Bay, 154, 269. LAUREL, common, 41; L., Portugal, 78. PICEA, 79. RAPHIOLEPIS, 210: *wet*, *Obs.*, 13, 28, 84-85, 88, 117, 221; ARALIA, 8. BERBERIS, 190. CYTISUS, 78. DAPHNE, 136. FURZE, 125. HERBACEOUS PLANTS, 38. HYPERICUM, 27. LAUREL, Bay, 82. LAUREL, common, 36, 246. LAURUSTINUS, 36, 190, 246, 269. LEYCESTERIA, 190, 246. PAMPAS GRASS, 6. PERNETTYA, 190. PHILESIA, 74. RETINOSPORA, 79. ROSES, 81. YEW, 16.

SNOW, drifting of, 279, 312; injury by, 206, 225; protection by, 135, 140, 157; CEDRUS, 89. HERBACEOUS plants, 129, 164. ROSES, 133, 301. VEGETABLES, 134, 146.

SOIL, character and effects of, 13, 28, 99, 141, 190, 336.

WIND, effects of, 5, 11, 15, 16, 20, 25, 50, 79, 94, 114, 121, 124, 127, 249, 256.

ABBREVIATIONS.

Alt., altitude. Asp., aspect. Av., average. Bar., barometer. Def., deficient. Diam., diameter. Dist., distance. Dwf., dwarf. Esp., especially. Exp., exposure. Fl. pl., flore pleno. Fls. or flrs., flowers. Fld. or fld., flowered. Frt., fruit. Ft., foot. Gen., general. Grd., ground. H. P., Hybrid Perpetual. Ht., height. Hyb., hybrid. Inj., injured or injury. Ins., inches. Jap., japonese or japonicus. Kd., killed. (*m*), misprint. Ms., miles. Max., maximum. Meteor., meteorological. Min., minimum. Months and seasons are indicated by first syllables. Obs., observations. Pt., point. Qr., quarter. Rep., report. Seasons (see months). Stand., standard. Sp., species. Temp., temperature. Therm., thermometer. Uninj., uninjured. Var., variety. Varieg., variegated or variegatus. Veg., vegetable. Yrs., years.

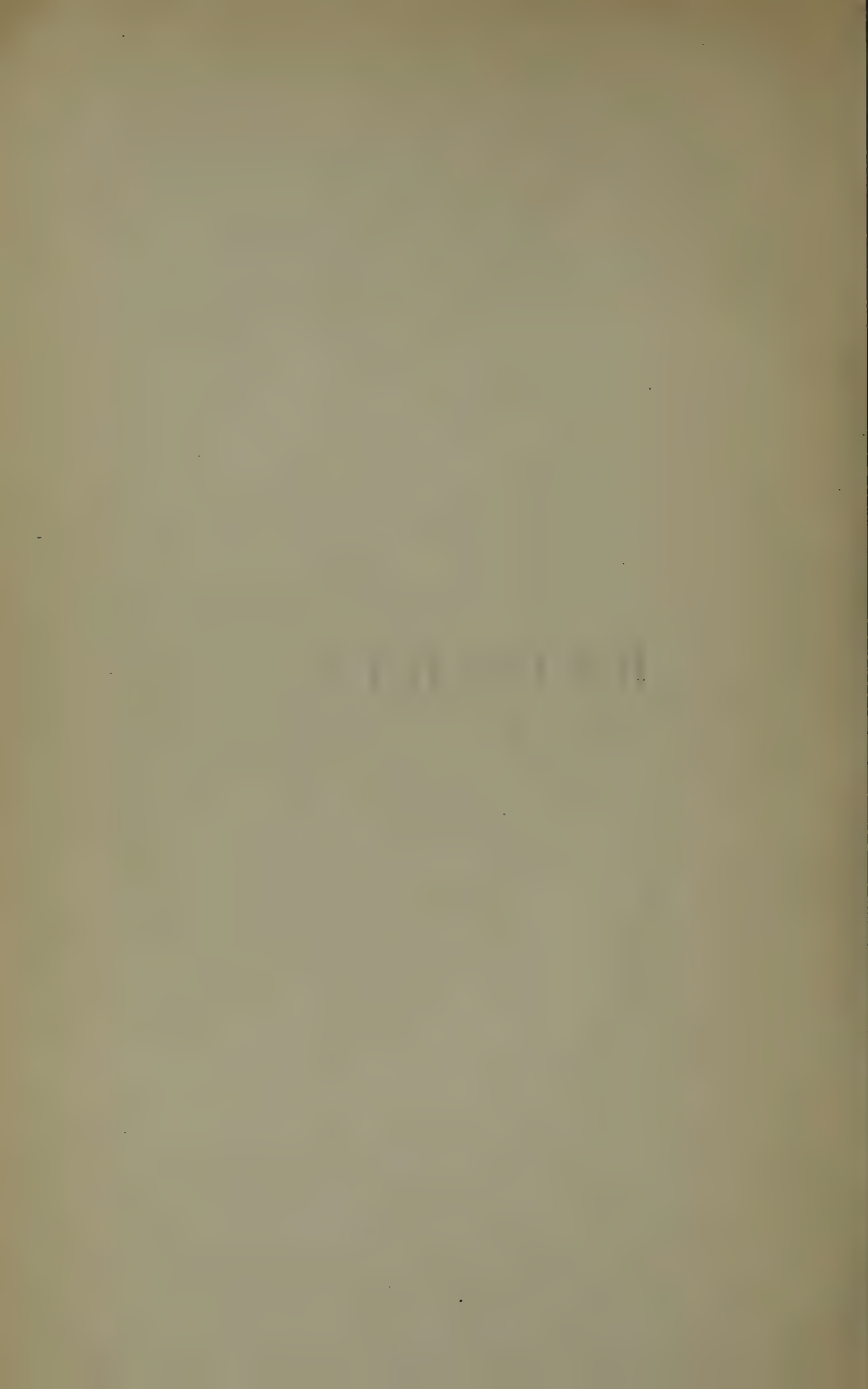
(1), killed; (2), severely injured; (3), slightly injured.

ERRATA.

Page 5, line 1, *read* Enborne; p. 24, l. 15, *read* 40 (1), 60 (2), 23 (3); p. 24, l. 25, *read* 38 (1), 45 (2), 16 (3); p. 30, l. 11, *read* Duvaua; p. 32, l. 2, *read* P. andina (*for* Andersoni); p. 39, l. 7 (*fr. bot.*), *read* P. Cembra (*for* Ambra); p. 51, l. 19, *read* Fortunei (*for* oxyacantha); p. 63, l. 9 (*fr. bot.*), *read* Vitex incisa; p. 66, l. 9 (*fr. bot.*), *read* Queen (*for* Green); p. 82, l. 20, *read* spicatum; do. l. 23, *read* Héricart; p. 94, l. 6 (*fr. bot.*), *read* yards; p. 100, l. 21, *read* Lucombe (*for* succirubra); p. 110, l. 23, *read* Byton; p. 113, ls. 1 and 8 (*fr. bot.*), *read* Geum (*for* Greens); p. 134, (*bot. line*), *read* Dec. 3rd, -4°; 4th, -8°; 5th, -1° (*see* Note, p. 143); p. 144, ls. 4 and 5 (*fr. bot.*), *dele* alt., 13 ft.; p. 151, l. 8 (*fr. bot.*), *read* Beurré Diel; p. 177, l. 14 (*fr. bot.*), *read* 49 (*for* 55); p. 182, l. 8, *read* Ozothamnus (*for* O); p. 188, l. 10 (*fr. bot.*), *read* Plants injured (Donegal), none; p. 220, 16 (*fr. bot.*), *read* Amicia; p. 237, l. 6, *read* at 3 places; p. 239, l. 7 (*fr. bot.*), *read* Jan.; p. 270, l. 7 (*fr. bot.*), *read* Galande (*for* Bellgarre); p. 278, l. 6, *read* Euonymus (*for* E.); p. 289, l. 5 (*fr. bot.*), *read* Late (*for* Lord); p. 299, l. 2 (*fr. bot.*), *read* pumila (*for* punica); p. 334, l. 22, *read* Hulkeana.

Missprints are referred to in the INDEX TO PLANTS by (*m*).

R E P O R T S .



DIVISION I.—MIDDLESEX.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM
MIDDLESEX.*

A year of unusual amount of bad and inclement weather, with absence of sunshine, a prevalence of fog, a low temperature, and, for the first three quarters, a low barometer (Isleworth). The last three months were very dry (Enfield). There were only 92 days on which the sun shone for more than two hours. There was a very marked absence of wind from the middle of September till the last three days of December. The average temperature of every month during the year was below the monthly average of 10 previous years, and the mean temp. of the year was $4^{\circ}7$ below the av. of 10 years (Uxbridge, Harefield). The autumn was exceptionally and continuously cold, extremely dry and rather dull, with a calm and humid atmosphere. Fogs frequent, with a prevalence of N. Easterly winds; bar. high. Few things ripened; apples and pears being about one-fourth of an ordinary crop; many vegetables, such as tomatoes and vegetable marrows, would not ripen at all. Potatoes, nearly all rotten. Throughout the summer the air was very damp. Great floods were in the valley of the Thames; the hay was inferior and difficult to save (Hanworth). A year of culminating disaster to agriculture and garden crops; of luxuriant growth in fruit trees but of weak and unripened wood (Isleworth). *Rainfall*, 4.94 ins. above the av. of 7 previous years, rain fell on 204 days (Muswell Hill); 2.39 ins. above the av. of 5 years (Enfield). *Min. rainfall*, Westminster, alt.,† 95 ft.; ht.,‡ 66 ft. 4 ins.; 27.18 ins., on 155 days: max., Mill Hill School, alt., 400 ft.; ht., 7 ins.; 36.27 ins. *Min. Temps.*, Enfield, Dec. 7th, 1879, $7^{\circ}9$; Colney Hatch, $6^{\circ}8$.§

* Observers' notes on the year 1879, Symons's "British Rainfall"; and "The Weather of 1879," by Ed. Mawley.

† Alt. refers to the altitude above the sea level.

‡ Ht. refers to the height of the guage above the ground.

§ On the Frost of December 1879, over the British Isles, by W. Mariott.

REPORTS.

1. CHISWICK. Royal Hort. Gardens.—Mr. A. F. Barron.

Amount of Rainfall, 1879—[Kew Obs., alt., 19 ft.; ht., 1 ft. 9 ins.; 33·08 ins.].

Minimum Temperature—12°.

Plants injured, 1879-80—9 (1), 1 (2)—*Cistus*, scarlet gum, 1. *Eryngium*, 1. *Escallonia macrantha*, on walls, 1. *Eucalyptus globulus*, 30 ft., 6 yrs. old, 1. *Euonymus*, gold and silver, all in nursery beds, 1. *Hypericum*, shrubby, 1. Laurel, common, 2. *Laurustinus*, 1. *Passiflora cœrulea*, 1. *Primula abyssinica*, 1. *Veronica*, shrubby, 1.

Observations—The full effects are not yet apparent (Jan 30th, 1880) but many valuable plants lately planted on the rockery are killed. The frost has been particularly severe on the golden *Euonymus*, all plants being killed in every part of the garden.

2. EALING, Castle Bar—Dr. M. T. Masters.

General Character of Soil—Stiff London clay.

Altitude and Exposure—250 ft.; N. W.

Rainfall, 1879—[Clair Lodge, alt., 200 (?) ft.; ht., 10 ins.; 30·89 ins.].

Min. Temp.—[Probably above 10°].

Plants injured, 1879-80—5 (1), 3 (2), 14 (3)—*Abies Nordmanniana*, lately moved, 3. *Aucuba japonica*, 3. *Buddlea globosa*, scarcely more than usual, 3. *B. Lindleyana*, 1. *Cistus*, gum, 1. *Colletia cruciata*, 2. *Escallonia rubra*, 3. *Euonymus japonicus*, 2. *Hypericum calycinum*, 3. *H. oblongifolium*, 3. Ivy, standards lately removed, 3. *Jasminum officinale*, 3. *Magnolia Soulangeana*, 3. Peaches, 3. *Quercus humilis*, 3. Roses, Celine Forestière, 2; Maréchal Niel, 3. Rosemary, 1. *Veronica*, hyb, 1. Wallflowers, 3. *Xanthoxylum alatum*, 1. *Yucca aloifolia*, 3.

Plants uninjured, *Buddlea globosa*, *Clematis balearica*, *Edwardia microphylla*.

DIVISION II.—S. E. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879, FROM
BERKSHIRE, HAMPSHIRE, ISLE-OF-WIGHT, KENT, SURREY
AND SUSSEX.

BERKS. A very exceptional year; very little sun (Purley). Very wet summer; three last months of the year unusually dry: *Rainfall* 6·5 ins. above av. (Long Wittenham). *Min. rainfall* (Wallingford), alt., 175 ft.; ht., 9 ins.; 28·96 ins., on 117 days: *Max.*, Reading [alt. ?] 38·39 ins., on 166 days.—*Min. Temp.*, Newbury, Dec. 7th, 13°·0.—Saturated clay caused failure of growth (East-hampstead). Trees in rich foliage in consequence of rain till end of Oct. (Twyford &c.).

Plants injured, 1879-80—7 (1), 11 (2), 8 (3), total at three places.

HANTS. *Rainfall*, April to Sept., 26·76 ins.; from Jan. to March and Oct. to Dec., only 12·19 ins., (Ovington). *Rainfall* of year very little above av., more than half the fall being from May to August, (Tylney Hall). 7·95 ins. above av. of 19 years (Southampton). *Mean temp.* of year 5° below av.: *Rainfall* below av. of 10 yrs. (Mudeford). *Min. Rainfall*, Mudeford, alt., 15 ft.; ht. 3 ins.; 26·14 ins., on 193 days: *Max.*, Petersfield, alt., 216 ft.; ht., 1 ft.; 43·48 ins., on 170 days. Wheat crop an almost unprecedented failure; Hay generally abundant but very bad. No orchard or wall fruit ripened properly, nor has the wood apparently for next year (East Tisted, Basing Park, Farnborough Grange). *Min. Temp.*, Swarraton, alt., 310 ft.; Dec. 7th, 9°·0.

Plants injured, 1879-80—43 (1), 36 (2), 30 (3), total at 8 places.

I. OF WIGHT. *Rainfall* above average, but not particularly so; temp. below the average (Newport). *Min. rainfall*, Osborne, alt., 172 ft.; ht., 8 ins.; 30·76 ins., on 154 days. *Max.*, Newport, alt., 57 ft.; ht., 12 ft. 9 ins.; 37·48 ins., on 186 days. *Min. Temp.*, Osborne, Dec. 7th, 18°·2.

Plants injured, 1879-80—36 (1), 7 (2), 9 (3), total at 2 places.

KENT. Very cold, not one warm week; snow fell in 8 months. Very wet Feb., April, May, June and Aug.; Oct., Nov., and Dec., very dry (Ramsgate, Bromley, and Tenterden). *Rainfall*, during 2nd and 3rd quarters nearly double the average (Erith). *Min. Rainfall*, Sittingbourne, alt., 38 ft.; ht., 1 ft. 1 in.; 22·43 ins.: max., Hythe, alt., 608 ft.; ht., 1 ft.; 43·67 ins. Greenwich Obs., alt., 155 ft.; ht., 5 ins.; 31·36 ins., on 185 days; or 6·20 ins. above mean. of 30 yrs., 25·06 ins. Harvest, especially pea crop, spoilt by wet in August (Benenden). Corn crops, hay, and wall-fruit all very bad (Selling). Fruits small and deficient in flavour (Canterbury). Potato crop spoiled, but grass land extraordinarily productive (Ramsgate). Shrubs short of fruit from the non-ripening of the wood (Sandwich, Southwood, &c.). *Temp.* of every month was below the av. of 60 yrs.; Dec. being 7°·4 below it. *Min. Temp.*, Eltham, alt., 80 ft.; Dec. 2nd, 7°·7. The period of very severe cold weather, which set in on Nov. 20, continued till Dec. 27th (38 days). The mean temp. was 31°·1, being 9°·7 below the mean of 60 yrs. (Blackheath).*

Plants injured, 1879-80—51 (1), 60 (2), 20 (3), total at 9 places.

SURREY. *Rainfall*, remarkable for extreme variations; March and Oct. had smallest for 20 yrs.; 3rd quarter of the year had highest for 20 years, and the last quarter, the lowest (Croydon). *Min. rainfall*, Croydon, [alt., ?]; ht., 3 ft.; 28·39 ins., on 179 days; max., Titsey, alt., 870 ft.; ht., 1 ft.; 46·28 ins., on 166 days. *Min. temp.*, Isleworth, alt., 68 ft.; Dec. 7th, 11°·5.

Plants injured, 1879-80—77 (1), 51½ (2), 61 (3), total at 7 places.

SUSSEX. *Rainfall*. The wet weather lasted from the end of March to the end of August, 108 days, with 19·62 ins. of rain. In the rest of the year there were 91 wet days and 12·64 ins. (Hayward's Heath); 4·56 ins. above av. of 23 yrs. (Maresfield); 1·70 ins. above av. of 20 yrs. (Glynde Place); 4·44 ins. above the av. of 10 yrs. (Worthing). *Min. rainfall*, Brighton (W. Pier Head), 19·30 ins.; max., Chichester, alt., 300 ? ft., 46·85 ins. *Min. Temp.*, Hayward's Heath, alt. 250 ft.; Dec. 7th, 16°·3.

Plants injured, 1879-80—42 (1), 54 (2), 37 (3), told at 6 places.

* Mr. Glaisher, in *Gardeners' Chron.*, Jan. 3rd, 1880, p. 23.

REPORTS.

1. **BERKSHIRE**,—NEWBURY, Exborne Lodge.—Mr. R. H. Valpy.

Gen. Char. of Soil—Gravelly, sandy loam or “drift.”

Alt. and Exposure—400 ft., S. W.

Rainfall, 1879—[Newbury, alt., 260 ft. ; 35·38 ins., on 203 days].

Min. Temp.—13° on two nights.

Plants injured, 1879-80—2 (1), 3 (2), 7 (3)—Apples, 3. Asparagus, 2. Broccoli, 2. Cabbages, Savoys, 1. Cedrus Atlantica, 3. Kale, Sea, 2. Laurel, Bay, 3. Nectarines, 2. Pampas Grass, 3. Peaches, 1. Plane, 3. Quercus Suber, 3. Taxodium distichum, 3.

Observations—Acorns on the common oak were abundant, but Quercus Cerris and Q. Ilex bore none. Apples, half a crop only. Apricots, Cherries of all sorts, Orleans Plums and Pears were failures. Of soft fruits, however, the crops were good, a remarkably fine one of Golden Drop occurring on a W. wall. Greengages were abundant and good. Of Nuts and Walnuts there were none.

2. **TWYFORD**, Harehatch.—Mr. G. T. Bulkeley.

Plants injured—Arbutus, of trees alone suffered, having lost a few branches.

3. **WOKINGHAM**, Easthampstead Park.—Mr. N. Sinclair.

Gen. Char. of Soil—Stiff clay on low ground, but a sandy light soil on upper.

Alt. and Exposure—255 ft., rather exposed in parts, and subject to spring frosts.

Amount of Rainfall, 1879—[Reading, dist., 8 ms. ; alt., 154 ft. ; ht., 1 ft. 6 in. ; 34·17 ins., on 185 days].

Date of Onset and Duration of Frost—Nov. 26th, for 5 weeks.

Min. Temp. and Date—Dec. 7th, 8°. Temp. frequently 12° ; Jan. 27th, 1880, 8°.

Plants injured, 1879-80—5 (1), 7 (2), 1 (3)—Abies Albertiana, Murr., (A. Mertensiana, Lindl.) 1. Arbutus macrantha (?), 2. Cedars, 2. Erica, fine old bushes, all killed to ground, 1, 2. Hollies, 1, 2. Laurel, Bay, 1. Laurustinus, 2. Magnolias, 3. Pinus insignis, 2. Roses, 1, 2.

Observations—The Abies mentioned above had been planted in the autumn, and was killed by the unusual severity of the long continuance of E. winds in spring, which withered the last bit of vitality. Fruit trees failed to set much fruit, particularly Apples and Pears.

Peaches, a failure. Respecting Vegetables, the saturated state of the clay soil caused the failure in growth, and, being in a half-developed stage, they were cut by the frost.

1. HAMPSHIRE—ALTON, Basing Park.—Mr. W. Smythe.

Gen. Char. of Soil—Stiff red clay, very strong; sub-soil of chalk.

Alt. and Exposure—About 500 ft. above sea. Hill much exposed to wind.

Amount of Rainfall—Rained most days during the summer of 1879. [East Worldham, dist., 2 ms.; alt., 499 ft.; ht., 1 ft. 6 ins.; 31.63 ins., on 178 days].

Date of Onset and Duration of Frost—From October till April.

Min. Temp.—26° [too high?].

Plants injured, 1879-80—7 (1), 13 (2), 2 (3). Apples, 1, 2. *Araucaria imbricata*, 3. *Asparagus*, 1. *Azaleas*, 2. *Cedrus Deodara*, 2. *C. Libani*, 2. *Euonymus japonicus*, variegated, 1. *Figs*, 2. *Furze*, 1. *Gooseberries*, 2. *Holly*, 2. *Juniperus communis*, *hibernica*, 1. *Larch*, 2. *Laurel*, common, 2. *Nectarines*, 2. *Peaches*, 2. *Pears*, 3. *Picea Pinsapo*, 2. *Quinces*, 2. *Rhododendrons*, hybrid, 1. *Vegetables of all kinds*, 1.

Observations—Many old and young fruit trees were killed and all much injured. The young wood was killed by the cold and wet summer, not being ripened. There was little or no fruit on the trees mentioned above.

Vegetables of all kinds were much injured, and many killed by the wet and cold summer.

2. ALTON, Binsted-Wyck.—Mr. W. Wickham.

Gen. Char. of Soil—Upper Green-sand or "malm."

Alt. and Exposure—400 ft., S. E.

Rainfall, 1879—[East Worldham, Alton, alt., 499 ft.; ht., 1 ft. 6 ins.; 31.63 ins., on 178 days].

Plants injured, 1879-80—3 (1), 2 (2), 4 (3)—*Arundo Donax*, 3. *Cercis siliquastrum*, 3. *Cistus ladaniferus*, 1. *Escallonia macrantha*, 3. *Euonymus japonicus*, 2. *Magnolia grandiflora* Exm. var., on S. wall, 3. *Myrtle*, 1. *Pampas grass*, large male plant in moist situation near water, 2; female, elsewhere, uninjured. *Spartium junceum* 1.

Plants uninjured, 1879-80—*Acanthus mollis*, *Aralia papyrifera*, *Asphodelus luteus*, *Azalea*, *Catalpa*, *Cupressus torulosa*, *Desfontania*

spinosa, Gentiana acaulis, Hibiscus syriacus, Bay Laurel, Laurustinus, Magnolia glauca (fine standard bush), Onoclea sensibilis, Pampas grass (female), Paulownia imperialis, Rhododendrons, Salisburia adiantifolia, Salvia patens, Spiraea (several sp.), Taxodium distichum.

Observations—I was careful not to have my borders made tidy; all leaves were allowed to remain as they fell. The smaller plants were protected with dead fern and branches, with ashes round the roots of all that were at all tender. The bloom on herbaceous plants has been finer than ever this year, 1880.

3. ALTON, Blackmoor House.—Mr. R. Lock.

Gen. Char. of Soil—Light, sandy.

Alt. and Exposure—Exposed to N. W. winds.

Rainfall, 1879—39.93 ins.

Date of Onset and Duration of Frost—Nov. 12th to Dec. 28th, and from Jan. 6th to Feb. 13th.

Min. Temp. and Date—Dec. 7th, 10°.

Plants injured, 1879-80—14 (1), 6 (2), 9 (3)—Apples, 1, 3. Apricots, 1, 3. Arbutus, 3. Artichokes, globe, 1. Borecole, 3. Broccoli, 1. Cabbages, 1. Ceanothus dentatus, 1. Cytisus, white and yellow, 2. Escallonia, 2. Euonymus japonicus, 1; Do. arg. var., 3. Kale, cottager's, 3; Do. Sea, 2. Lavender, 1. Passiflora, 1. Peaches, 1, 3. Pears, 1. Pinus insignis, 2. Rhododendrons, 3. Roses, 1, 3. Rosemary, 1. Thyme, lemon scented, 2. Wallflowers, 1, 3.

Plants uninjured—Euonymus japonicus argenteus, Yucca gloriosa.

4. ALTON, Rotherfield Park.—Mr. C. E. Curtis.

Gen. Char. of Soil—Friable, self-drained clay, resting on chalk.

Alt. and Exposure—About 400 ft.

Plants injured, 1879-80—Laburnum, 1, 2, 3, has suffered greatly. Larches, out of 150,000 about 50,000 perished; the remainder are doing well. Of young plants, transplanted two years in nursery, 50 per cent. are lost. I attribute the loss to the severe winter and the dry weather in early spring of 1880. It is a most unusual thing to have young plants of this kind affected; as they have hitherto withstood weather of all description. (Oct. 14, 1880.)

5. BOURNEMOUTH.—Mr. T. J. Swaffield.

Gen. Char. of Soil—Sandy peat, mostly on gravel.

Alt. and Exposure—From sea-level to 100 ft.

Rainfall, 1879—Rain and melted snow in Oct., Nov. and Dec.

(38 days) was 5·32 ins. [Christchurch, alt., 90 ft.; ht., 6 ins.; 29·83 ins., on 187 days].

Min. Temp. and Date—Eleven coldest days in Dec., Mean Temp. 25°·6.

Plants injured, 1879-80—5 (1), 6 (2), 11 (3)—*Agapanthus umbellatus*, 3. *Aloysia citriodora*, last summer's growth, 3. *Aralia spinosa*, in damp places by R. Bourne, 3. *Ceanothus dentatus* superbus, (best in coldest part of the town), 3. *Echeveria secunda*, glauca, 1, 2. *Escallonia macrantha*, 3; *E. montevidensis*, 2. *Eucalyptus*, some over 36 ft., all left from 1878-79, 1. *Euonymus*, all the varieties, 2, 3. *Genista racemosa*, 1, 3. *Myrtles*, 3. *Passiflora*, 3. *Paulownia imperialis*, 3. *Phormium tenax*, 2. *Rhynchospermum jasminoides*, 1. *Richardia æthiopica*, no flowers, 3. *Roses*, Tea, young plants only, 2. *Veronicas*, 1, 2; the old white variety is much hardier than the others.

Plants uninjured—*Abutilons*, *Agapanthus umbellatus* (in some gardens), *Aralia Sieboldti*, *Camellias*, some 10 ft. in diameter, bore few flowers owing to the unripe state of wood, but unaffected by frost, *Coronillas*, *Euonymus*, vars., close to the sea; but much injured half a mile away; *Fuchsias*, *Latania borbonica*, *Lilium auratum*, *L. lancifolium*, *Magnolias*, *Phormium tenax*, within a mile of sea.

6. WINCHESTER, Bramdean.—Mr. C. Burgess.

Gen. Char. of Soil—Light, on chalk and gravel.

Rainfall, 1879 — [Otterbourne, dist., 10 ms.; alt., 115 ft.; ht., 1 ft. 3 ins.; 37·84 ins., on 151 days].

Date of Onset and Duration of Frost—Nov. 12th, 20°.

Min. Temp. and Date—Dec. 6th, 3° [too low?].

Plants injured, 1879-80—4 (1), 0 (2), 2 (3)—*Arbutus*, 1. *Aucubas*, 3. *Euonymus*, of sorts, 1. *Laurel*, Bay, 1. *Laurel*, common, 3; *Laurustinus*, 1.

7. FARNBOROUGH, The Grange.—W. Sherwin, Esq.

Gen. Char. of Soil—Light sand and gravel.

Alt. and Exposure—Open and somewhat low.

Rainfall, 1879—31·79.

Min. Temp. and Date—[Strathfield Turgiss, dist., 11 ms.; Dec. 7th, 10°3].

Plants injured, 1879-80—5 (1), 8 (2), 3 (3)—*Apples*, 3. *Arbutus*, 2. *Berberis Darwinii*, 2. *Buddlea globosa*, 1. *Cercis canadensis*, 1.

Eucalyptus, 1. Holly, golden green, 1. Laurustinus, 2. Ligustrum japonicum, 3. Liriodendron tulipifera, aurea, 1. Pavias, 1. Poinsettias, 2. Quercus austriaca, sempervirens, 2. Q. Cerris, 2. Q. Fordii, 2. Rhododendrons, 3.

Observations—Of Arbutus and Laurustinus I had a number of very fine plants, of some 20 years growth. They were nearly all killed to the ground. They were much injured in 1878, and still more in 1879. Those left out, the majority being removed, have again put forth shoots. Apples and Pears neither on the wall nor as standards did well and gave very little fruit. Rhododendrons were injured, and I never knew them flower so badly but never saw them so promising as in this year (1881). Small fruits did not suffer and cropped well.

8. SOUTHAMPTON (Nurseries).—Mr. Rogers.

Plants uninjured, 1879-80—Aralia Sieboldii, Bambusa Metake, Chamaerops Fortunei, Elæagnus, vars., Osmanthus, vars., Skimmia japonica.

9. SOUTHAMPTON, Testwood Park.—Mr. H. Vickery.

Gen. Char. of Soil—Sandy loam.

Alt. and Exposure—30 ft. ; moderately sheltered.

Rainfall, 1879—[Ordnance Survey Office, alt., 75 ft. ; ht., 1 ft. ; 36·39 ins, on 181 days].

Min. Temp.—0° [too low ?]—[Southampton, Woolston Lodge, 13°·5 : at an alt., 140 ft. ; Dec. 7th, 14°·7 ; Do., alt., 74 ft. ; 17° : Netley, dist., 3 ms. ; alt., 37 ft ; 15°].

Plants injured, 1879-80—5 (1), 6 (2)—Alternantheras, entirely killed by wet summer, 1. Ceanothus azureus, on W. wall, 2. Chamaerops excelsa and C. Fortunei, survived three winters in well sheltered place, 1. Escallonia macrantha, in open, 2. Eucalyptus globulus, one, and six years old, 1. Figs, old trees, 2. Pampas Grass, large plants, parts of which, 1. Nectarines and Peaches, by wet summer and winter, 1, 2. Phormium tenax, old plant, 2. Quercus Suber, stripped of foliage, 2.

1. ISLE OF WIGHT, Ryde.—Rev. H. Ewbank.

Gen. Char. of Soil—Loam.

Altitude—About 500 ft.

Rainfall, 1879—Oct., 1879, to March, 1880, inclusive, 7·97 ins., [Ryde, alt., 17 ft. ; ht., 7 ft. 6 ins. ; 34·41 ins., on 145 days].

Date of Onset and Duration of Frost—Mean Temp. (at Ventnor) of Nov. and Dec., 40°-12.

Min. Temps. and Date—18°; [Osborne, dist., 5 ms.; Dec. 7th, 18°-2; Ventnor, dist., 10 ms.; alt., 75 ft.; Dec. 5th, 20°.

Plants injured, 1879-80—24 (1), 2 (2), 1 (3)—*Acacia dealbata*, 2. *Balsamita grandiflora*, 1. *Boussingaultia baselloides*, 1. *Campanula pulla*, 1. *Cantua dependens*, protected and recovering, 3. *Clianthus puniceus*, 2. *Cortusa pubescens*, 1. *Diotis maritima*, 1. *Eryngium eburnense*, 1. *Escallonia pulverulenta*, 1. *Fritillaria recurva*, 1. *Habranthus pratensis*, 1. *Hedychium Gardnerianum*, in some places, 1. *Hypericum canariense*, 1. *Iris Hartwigii*, 1. *Lithospermum petræum*, 1. *Meconopsis aculeata*, 1. *Melianthus major*, 1. *Milla biflora*, 1. *Mutisia decurrens*, 1. *Ornithogalum arabicum*, 1. *Primula capitata*, 1; *P. sikkimensis*, 1. *Scilla undulata*, 1. *Sparaxis pulcherrima*, 1. *Valletta purpurea*, 1. *Viola Munbyana*, 1.

Plants uninjured—*Abelia floribunda*, *Aralia Sieboldii*, *Bouvardia splendens*, *Brugmansia*, *Calochorti*, *Camellias*, *Cantua dependens*, *Citrus trifoliata*, *Clematis indivisa lobata*, *Convolvulus sericeus*, *Daphne indica rubra*, *Eucalyptus resiniferus*, *Friesia odorata*, *Fremontia californica*, *Habrothamnus fasciatus*, *Hedychium Gardnerianum*, *Ixias*, *Kniphofia caulescens*, *Lapageria rosea*, *Lilium auratum*, *L. Brownii*, *L. giganteum*, *L. speciosum*, &c. *Mandevilla suaveolens*, *Rubus australis*, *Tritoma aurea*, *T. M'OWeni*.

2. RYDE, Appley Towers—Mr. W. Stanbury.

Gen. Char. of Soil—Loam, mostly resting on clay subsoil.

Alt. and Exposure—100 to 200 ft., N. W., N., and N. E.

Rainfall—[Ryde, alt., 17 ft.; ht., 7 ft., 6 ins.; 34.41 ins., on 145 days].

Min Temp. and Date—About Dec. 11, [7th, ?] 15°.

Plants injured, 1879-80—11 (1), 5 (2), 8 (3)—*Abutilon*, vars., 1. *Acacia armata*, stood many winters, 1; *A. longifolia*, 1. *Agapanthus umbellatus*, 3. *Agnostus sinuata*, 1. *Aloysia citriodora*, 3. *Araucaria Cookii*, 1. *Banksia australis*, 1. *Cantua dependens*, 1. *Cassia corymbosa*, 1. *Clethra arborea*, 1. *Clianthus magnificus*, 3. *Echeveria secunda* &c., 1. *Escallonia grandiflora*, 2; *E. montevidensis*, 3. *Lapageria rosea*, 3; *L. alba*, 3. *Leucopogon Cunninghamii*, 1. *Lomatia heterophylla*, 2. *Magnolia grandiflora*, 3. *Metrosideros floribundus*, 2. *Olearia Haastii*, 3. *Rhyncospermum jasminoides*, 2. *Swammerdamia antennaria*, on the exposed side, 2.

Plants uninjured—*Araucaria brasiliensis*, *Cantua dependens* (on a South wall).

Observation—*Rhyncospermum jasminoides*, though injured in 1879-80, was unhurt in 1878-9.

1. KENT—SANDWICH, Betteshanger.—Mr. G. Laurence.

Gen. Char. of Soil—Chalky.

Alt. and Exposure—Country slightly undulating, exposed to sea breezes on E. About 4 ms. from the sea.

Rainfall, 1879—34·59 ins.—[Sandwich (Walton House), dist., 3 ms.; alt., 55 ft.; ht., 2 ft. 10 ins.; 25·97 ins.

Min. Temp. and Date—[Dec. 17th, (?)] 17°. [Ramsgate, dist., 9 ms.; alt., 105 ft.; Dec. 7th, 20°·9; Dover, dist., 7 ms.; Dec. 17th, 18°]. 13° and 14° for several successive nights in Jan. 1880.

Plants injured, 1879-80—8 (1), 8 (2)—Broccoli, 1, (26 p. c. saved). Escallonias, 2. *Eucalyptus globulus*, 1. *Euonymus*, variegated, 2. Figs, 2, in valley; uninjured on hills. Furze, fl. pl., 2. *Gladiolus*, 1. *Leycesteria formosa*, 1. Myrtle, 1. Nectarines, 2. Peaches, 2. Roses, general, 2; Maréchal Niel, 1. Thyme, 1. Veronicas, 1. Vines, out-door, 2.

Plants uninjured—Apricots, *Erythrina christa-galli*, Fig trees exposed on hills, *Laurustinus* escaped without the slightest injury and was in flower the greatest part of the winter.

Observations—Both deciduous and evergreen shrubs were very short of fruit this year, in consequence of the wet season of 1879, for the wood did not ripen. Trees of all kinds in exposed situations suffered more from the cold winds of last May (1880) than they did from the wet of 1879 or the frost of 1879-80.

2. BLACKHEATH.—Mr. H. Jarvis.

Gen. Char. of Soil—Very light and gravelly.

Alt. and Exposure—160 ft.; S.

Rainfall, 1879—[Alt., 160 ft.; ht., 5 ins.; 31·38 ins., on 179 days].

Date of Onset and Duration of Frost—[From Nov. 20th to Dec. 27th. Mean temp. for these 38 days, was 31°·1 or 9°·7 below av. of 60 yrs.—*Glaisher* *].

Min. Temp. and Date—[Dec. 2nd, 14°·1].

Plants injured, 1879-80—8 (1), 12 (2)—*Arbutus Unedo*, about

* *Gard. Chron.*, 1880, p. 23.

80 plants, 12 to 18 ft., 1. *Aucuba japonica*, some cut to ground, but again breaking, 2. *Berberis Darwinii*, 2; *B. japonica*, nearly all, 1, 2. *Chelone*, vars., to ground, 2. *Cytisus*, large white, to ground, 2. *Hypericum calycinum*, 2. *Kalmia latifolia*, 2. Laurel, Bay, to grd., 2. *L.* common, a good many nearly to grd., 2. *Laurustinus*, very fine plants, 1. Lavander, 1. Myrtle, large, 1. Pampas Grass, 2. *Primula acaulis*, vars., 1. Rosemary, very fine old plant, 1. *Saxifraga*, various kinds, 2. Vincas, large beds, 1. Wall-flowers, vars., 2.

Observation—Some varieties of herbaceous plants suffered very much.

3. BROMLEY.—Rev. A. Rawson.

Gen. Char. of Soil—Gravel in parts, and clay in parts.

Alt. and Exposure—250 ft.; chiefly sheltered.

Rainfall, 1879—Alt. 250 ft.; ht., 1 ft.; 33·04 ins., on 187 days; mean annual fall for 15 years, 29·804 ins.

Date of Onset and Duration of Frost—Nov. 13th, almost uninterruptedly to Feb. 5th.

Min. Temp. and Date—Dec. 2nd, 7°.

Plants injured, 1879-80—6 (1), 8 (2), 3 (3)—*Aloysia citriodora*, on E. wall, 2. *Berberidopsis*, against pailing, 2. Broccoli, all sorts, 1. *Buxus balearicus*, 2. *Calopogon pulchellum*, 1. *Catalpa syringæfolia*, 3. *Clematis lanuginosa*, on pailing, 3. *Eremurus robustus*, 2. *Fremontia californica*, on pailing, 1. *Iris fimbriata*, 2. Laurel, Bay, 1. *Laurustinus*, 2. *Ophiopogon Jaburan*, 1. *Photinia serrulata*, 3. *Populus angulosa*, young tree, 1. *Stauntonia latifolia*, on S. wall, 2. Roses, Tea, to ground, 2.

Plants uninjured—*Acer polymorphum*, *Bomarea acutifolia*, *Cyphella Herberti*, *Mimulus moschatus*, *Saxifraga purpurascens*, *Senecio pulcher*.

4. DARTFORD.—Mr. J. Dean.

Gen. Char. of Soil—Stiff sandy clay with a sandy subsoil.

Exposure—Sloping towards S.

Rainfall, 1879—[Alt., 162 ft.; ht., 2 ft. 4 ins.; 25·36 ins.].

Min. Temp. and Date—(Dec. 2nd ?) 7°.

Plants injured, 1879-80—4 (1), 3 (2), 1 (3)—*Bellis perennis*, in beds for spring blooming, 1. Broccoli, all, both white and purple, 1. Celery, frozen to very roots, though earthed abundantly, 1. Laurel, Bay, to ground, 2. Laurel, common, a great many, 1, 2. *Laurustinus*, 2. *Quercus Ilex*, 3.

Plants uninjured—Of Plants which survived, a solitary Dahlia, a dark variety, came up wonderfully strong, and had an immense quantity of bloom all the summer. Echeveria secunda stood the winter well, with only a covering of matting.

Observations—The soil of the vegetable garden being of a very stiff nature, the water, of which there is a good deal, seemed to injure the plants more than the frost. The frost setting in so early completely destroyed all autumn giant cauliflower and other tender vegetables, which were not housed in time: *e.g.* Dahlias were well in bloom when overtaken, and the roots were frozen and rotted in the ground.

5. HILDERBOROUGH, Southwood.—Mr. H. Truelove.

Gen. Char. of Soil—Very stiff and heavy, resting on clay.

Exposure—Rather exposed.

Rainfall, 1879—[Tunbridge (St. Mary's), dist. 2 ms.; alt., 96 ft.; ht., 1 ft. 6 ins.; 29·22 ins., on 159 days].

Date of Onset and Duration of Frost—Nov. 22nd to Feb. 13th.

Min. Temp. and Date—Dec. 7th [2nd ?], 7°. [Tunbridge, alt., 99 ft.; Dec. 2nd, 9° 4].

Plants injured, 1879-80—2 (1), 2 (2), 3 (3)—Arbutus, 2. Aucuba japonica, 3. Cedrus Deodara, 3. Euonymus, nearly white var., 1. Laurel, common, 3. Laurustinus, 2. Roses, one half, 1.

Observations—Nectarines and Peaches did not ripen their wood, or produce any flowers. Pears, very few. Apples, Cherries, Currants, Gooseberries, Raspberries and Strawberries, abundant.

6. MAIDSTONE, Mereworth.—Mr. N. Francis.

Gen. Char. of Soil—Yellow loam with subsoil of gravel rag-stone.

Alt. and Exposure—About 540 ft.

Rainfall, 1879—Very considerable [Tovill House, alt., 60 ft.; ht., 1 ft.; 26·94 ins., on 162 days].

Date of Onset and Duration of Frost—Nov. 20th to Feb. 28th.

Plants injured, 1879-80—8 (1), 13 (2), 1 (3)—Apples, 1, 2. Asparagus, 2. Broccoli, 1. Cabbages, 2. Chrysanthemum, 1. Cineraria, 1. Hydrangea, 2. Laurel, Bay, 1. Laurustinus, 1. Liriodendron tulipifera, 3. Mulberry, 2. Myrtle, 2. Peaches, 1, 2. Plane, 2. Raspberries, 2. Roses, H. P., 2; Tea, 1. Syringa, 2. Tritoma, 2. Violets, 2.

7. OLD CHARLTON, Bramhope.—Col. Bushe.

Gen. Char. of Soil—"Woolwich beds" consisting of a light sandy loam, well drained.

Alt.—About 70 ft. above the Thames.

Rainfall—[Greenwich Roy. Obs., dist., 2 ms.; alt., 155 ft.; ht., 5 ins.; 31·36 ins., on 185 days].

Min. Temp. and Date—[Greenwich, Dec. 7th, 13°·6; or 19°·7 below av. of 20 yrs.; (Ed. Mawley)].

Plants injured, 1879-80—2 (1), 3(2), 2 (3)—Aucuba cuttings, 1. Laurel, Bay, one or two, 1; others cut to ground, 2 or 3. Laurel, common, 2. Oaks, all seem to be suffering, 2, 3.

Plants uninjured—Aucubas; Laurels, Bay, some plants; Laurel, common, cuttings put in Nov., nearly all rooted and made good plants in 1880; Liliun auratum, in open, but protected by a mulching; Forest trees, generally very healthy, are uninjured, excepting Oaks. Fruit trees all did well, though late and severely pruned in the winter.

8. TUNBRIDGE WELLS, Dunorlan.—Mr. D. Walker.

Gen. Char. of Soil—Lower ground, a strong loam on a very stiff clay. Higher ground, a sandy loam on a sandy rock.

Alt. and Exposure—From 80 to 160 ft. above Sea, on a S. E. slope, only exposed to S. wind.

Rainfall, 1879—[T. Wells (Pembury), alt., 181 ft.; ht., 1 ft. 8 ins.; 30·53 ins., on 174 days].

Date of Onset and Duration of Frost—Oct. 16th, 29°. Thaw began Dec. 28th, 43° and 46°. Jan. 7th to Feb. 18th, daily average, 23°. Daily average min. temp. for Dec., 26°, ranging from 16° to 36°; for Jan. 26°, ranging from 14° to 44°.

Min. Temps. and Dates—Dec. 2nd, 15°. Jan. 20th and 29th, 1880, 14°. [Mr. Punnett, Tunbridge, alt., 99 ft., records Min. Temp., Dec. 2nd, 3rd, 9°·4].

Plants injured, 1879-80 — 3 (2), 8 (3)—Arbutus Unedo, 2. Berberis Darwinii, 3. Camellias, on lower ground only, 3. Cedrus Atlantica, 3; C. Deodara, 2, 3 (see below). Cupressus macrocarpa, in lower ground, 3. Escallonia macrantha, 3. Picea lasiocarpa, [*Hort.*, P. Lowiana, *Gord*], 3. Pinus insignis, 2. Roses, 3.

Plants uninjured—Camellias situated on high ground, Cupressus, vars., Desfontania spinosa, Bay Laurel, Common Laurel, Libocedrus decurrens, Sequoia gigantea, Thuja (several vars.), Thujopsis dolabrata. There were besides a great many other conifers and ornamental shrubs, but none suffered except those mentioned above.

Observations—Cedrus Deodara, 18 trees, 30 to 35 ft. high, in an

avenue on the higher ground, were slightly injured ; while of 30 trees, 30 to 35 ft. high, in an avenue on the lower ground, 3 were injured severely and 5 slightly.

9. DEAL, Walmer Castle and St. Margaret's Bay.—Mr. J. Swinnard.

Gen. Char. of Soil—A nice loam with a subsoil of stiff clay.

Alt. and Exposure—Slightly elevated above sea level.

Rainfall, 1879—[Northbourne, Deal, dist., 3 ms.; alt., 60 ft.; ht., 1 ft. 2 ins.; 34.59 ins., on 170 days].

Min. Temp. and Date—[Dec. 17th ?] 15°. [Dover, dist., 7 ms.; alt., 30 ft.; Dec. 17th, 18°].

Plants injured, 1879-80—13 (1), 8 (2), 2 (3)—*Aloysia citriodora*, 1. *Anemone*, roots, 1. *Broccoli*, 1. *Chrysanthemum*, 1. *Lilium auratum*, 1. *Narcissus*, bulbs, 1. *Potatoes*, 1. *Roses*, standards, 2. *Veronicas*, 1. Of Fruit Trees, Apples, Pears and Plums, the fruit only was destroyed. At St. Margaret's Bay (5 ms. from Walmer), great losses occurred amongst Conifers and other trees as follows:—*Birch*, 1, 2. *Box*, 2. *Cupressus Lawsoniana*, (about 70), 1. *Elm*, 2. *Euonymus*, 2. *Holly*, 3. *Laurel* (1000), 1. *Lime*, 2. *Pinus Austriaca* (600), 1. *P. insignis* (1000), 1, 3. *P. Laricio* (50), 1. *P. sylvestris* (1000), 1. *Plane*, 2. *Yew*, 2. I find generally the plants and shrubs of all kinds to have been more injured by the cold Easterly winds than by the frost.

1. SURREY—BAGSHOT.—Mr. C. Noble.

Gen. Char. of Soil—Light sandy soil for the most part.

Rainfall, 1879—[Chertsey, dist., 9 ms.; alt., 47 ft.; ht., 1 ft.; 31.26 ins.].

Min. Temp. and Date—[Easthampstead Park, dist., 5 ms.; Dec. 7th, 8°].

Plants injured, 1879-80—The injury sustained in my nursery has been very limited indeed ; but one or two matters seem worthy of notice. The first in importance is the loss among Dwarf Roses. Up to April (1880), I was unaware of any roses, except Teas having been killed. The wood and tops of the shoots appeared fresh and plump. My first intimation of injury was the discovery of the plants being dead at the insertion of the bud. About 50 p. c. were dead. Double Furze (*Ulex europæus*, fl. pl.) in pots plunged out of doors was affected in precisely the same way. It was totally killed.

2. GUILDFORD, East Horsley Towers.—Earl of Lovelace.

Gen. Char. of Soil—Various; gravel and loam in the pleasure ground with a subsoil of chalk at depths from 7 to 20 feet.

Alt. and Exposure—300 ft., slightly sloping Northwards to the Thames valley.

Rainfall—[Guildford, dist., 7 ms.; alt., 220 ft.; ht., 11 ins.; 32·15 ins., on 159 days].

Plants injured, 1879-80—2 (1), 3 (2)—*Abies* (*Picea*) *Cephalonica*, lost most of its leaves, 2; *A. (Picea) lasiocarpa*, in the woods, apparently as much from unsuitable soil as cold, 1. *Arbutus*, 2. *Cedrus Deodara*, 13 yrs., 2; *C. Libani*, 45 yrs., lost most of its leaves, 2. *Pinus insignis*, 6 ft. high, 1. Yew, a whole hedge-row, 7 or 8 ft. high, 2. Probably it was owing to excessive wet of 1879, stimulating unwholesome growth late in the autumn (aggravated by clipping) and then checked by early frost before the wood ripened.

3. SUTTON, Mulgrave Road.—Mr. F. Hepburn.

Gen. Char. of Soil—Sandy loam, 2 to 3 ft. deep, on chalk.

Alt. and Exposure—About 220 ft. Sheltered on N. and E., exposed to S. and W.

Rainfall—[Alt., 230 ft.; ht., 7 ft. 3 ins.; 30·28 ins.]—to Nov., 15·57 ins.

Date of Onset and Duration of Frost—Sept. 1st, Oct. 16th, 17th, 26th. Frost set in Nov. 13th—30th, Dec. 1st—27th, Jan. 5th—30th. Feb., ten days between 1st and 25th; March 18th—29th, with cutting E. wind, which apparently did more damage than the frost of Dec. and Jan.

Min. Temp. and Date—Dec. 10th, 10°; Jan. 2nd, 12°; 20th, 27th, 28th, 13°.

Plants injured, 1879-80 — 6 (1), 1 (2), 6 (3) — *Althæa rosea*, seedlings sown in July, 1, 3. *Arbutus Unedo*, stood winter, began to flag first week in April, three-fourths died, cut down end of June, shooting again. *Berberis Darwinii*, all leaders killed, 3. *Chimonanthus fragrans*, showed weak growth and absence of flowers; now vigorous (Oct. 1880), 3. *Euonymus japonicus*, 3. *Fuchsia virgata* and *F. Riccartoni*, all transplanted in autumn, 1. *Gladiolus*, bulbs in ground, 1. Laurel, Bay, 3. Laurel, common, 3. *Lilium candidum*, 1, 2 (about 25 p. c. survived). *Paulownia imperialis*, in a well sheltered garden, 1. *Sophora japonica*, young trees planted in autumn, 79 lived through the winter, but much injured during frost with E. wind in March. Wallflowers, all planted out, Oct., 1879, 1.

Plants uninjured—*Althæa rosea*, old plants. *Catalpa bignonioides*. *Fatsia papyrifera*, small plant. *Fuchsias*, not transplanted and protected with fibre. *Paulownia imperialis*. Wallflowers self-sown or planted before Oct., 1879.

4. SUTTON, Renhill Street.—Mr. T. Hogg.

Gen. Char. of Soil—Sandy loam on chalk and gravel. The river Bourne passes under a portion of the nursery.

Altitude—About 140 ft.

Rainfall, 1879—[Alt., 230 ft.; ht., 7 ft. 3 ins.; 30·28 ins.].

Date of Onset and Duration of Frost—See report No. 3.

Min. Temp. and Date—Do. [Addiscombe, dist., 5 ms.; Dec. 7th, 13°·6].

Plants injured, 1879-80—14 (1), 10 (2), 1 (3)—*Arbutus Unedo*, 1. *Biota orientalis*, 2. *B. o. aurea*, 3. *Cedrus Deodara*, 1, 2. *Cercis siliquastrum*, 1. *Cupressus macrocarpa*, young, 1. *Escallonia macrantha*, 1. *Euonymus japonicus*, 1. *Genista alba*, 2. Laurel, Bay, 1, 2. Laurel, common, 2. *Laurustinus*, 1, 2. *Ligustrum lucidum ovifolium*, 1, 2. Mulberry, 1. Pampas grass, 1. *Platanus orientalis (acerifolia)*, 2. *Populus pyramidalis*, all, 1. *Rosa canina*, 75 p. c. of briars for budding killed, 1, 2. *Spartium juncenum*, 2. *Thuja Lobbii*, 1.

Plants uninjured—*Biota orientalis elegantissima*, Common Laurel, vars., *Colchica* and *rotundifolia*, *Cupressus macrocarpa* (old plants), *C. Lawsoniana*, *C. Nutkaensis* (*Thujopsis borealis*), *Euonymus radicans*.

5. WIMBLEDON, Atherton Grange.—Mr. J. Nunns.

Gen. Char. of Soil—Sand and gravel.

Rainfall, 1879—30·97 ins.

Date of Onset and Duration of Frost—Nov. 16th till Dec. 27th; Jan. 4th till April 26th.

Min. Temps. and Dates—Dec. 7th, 10°; Jan. 20th, 11°.

Plants injured, 1879-80—3 (1), 1 (3)—*Aucuba japonica*, 3. *Meconopsis Wallichii*, 1. Pampas grass, 1. *Senecio pulcher*, 1.

6. WIMBLEDON, Oakfield.—Mr. G. C. Joad.

Gen. Char. of Soil—Sandy gravel and clay.

Alt. and Exposure—About 150 ft.

Rainfall, 1879—[Alt., 170 ft.; ht., 3 ft.; 30·26 ins., on 191 days].

Min. Temp. and Date—Dec. 6th, 7th, 10°; Jan. 19th, 20th, 11°.

Plants injured, 1879-80—49 (1), 16 (2), 39 (3)—*Abelia rupe-*

tris, 3; *A. uniflora*, 1. *Æthionema grandiflorum*, 1. *Alstroemeria aurea*, 3; *A. chilensis*, 1; *A. peruviana*, 1. *Ammobium alatum*, 1. *Andromeda arborea*, 1. *Aphyllanthes monspeliensis*, 1. *Aralia Sieboldii*, 1. *Arbutus Unedo*, 3. *Aristolochia altissima*, 2. *Aristotelia Macqui*, 2. *Asclepias tuberosa*, 3. *Asphodelus tauricus*, 1. *Azara parviflora*, 2. *Bambusa edulis*, 1; *B. nigra*, 1. *Bellis sylvestris*, 1. *Benthamia fragifera*, 3. *Berberis trifoliata*, 2. *Bravoa geminiflora*, 1. *Buddleia Lindleyana*, 1. *Calycanthus floridus*, 3. *Cassia marilandica*, 1. *Ceanothus thyrsiflorus*, 1. *Cedronella cana*, 1. *Cerasus ilicifolius*, 1. *Chamærops humilis*, 1. *Chimonanthus fragrans*, 3. *Choisya ternata*, 1. *Cissus antarctica*, 1. *Cistus*, all sp. except those mentioned below, 1. *Clerodendron foetidum*, 3. *Coriaria myrtifolia*, 1. *Cuninghama sinensis*, 3. *Daphne collina*, 1. *Diospyros Kaki*, 1. *Edwardsia grandiflora*, 2. *Eriobotrya japonica*, 3. *Eryngium Lasseamsii*, 2. *Escallonia illinita*, 1. *E. macrantha*, 3. *E. Organensis*, 1. *Eulalia japonica*, 2. *Euonymus fimbriatus*, 1; *E. radicans*, 1; *E. tingens*, 1. *Eurya japonica*, 1. *Eurybia ilicifolia*, 1. *Fontanesia phylliræoides*, 3. *Fuchsia velutina*, 2. *Garrya macrophylla*, 3. *Glyptostrobos heterophyllus*, 3. *Gordonia pubescens*, 3. *Griselinia littoralis*, 1. *Gunnera manicata*, 1; *G. scabra*, 3. *Gynerium argenteum*, 2. *G. jubatum*, 1. *Helwingia ruscifolia*, 2. *Hydrangea nivea*, 3; *H. Otaksa*, 3; *H. quercifolia*, 1. *Idesia polycarpa*, 3. *Illicium floridanum*, 3. *Indigofera Dosua*, 3. *Kadsura japonica*, 1. *Kniphofia sarmentosa*, 1. *Lardizabala biternata*, 3. *Leucophyta Brownii*, 1. *Leycesteria formosa*, 3. *Libocedrus chilensis*, 3. *Lupinus arboreus*, 1. *Mikania scandens*, 1. *Muhlenbeckia sagittifolia*, 2; *M. complexa*, 3. *Mutisia Clematis*, 2. *Nandina domestica*, 2. *Neillia thyrsiflora*, 3. *Nyssa multiflora*, 1. *Olea europæa*, 1. *Othonna cheirifolia*, 3. *Paliurus aculeatus*, 3. *Paulownia imperialis*, 3. *Peraphyllum ramosissimum*, 3. *Planera acuminata*, 3. *Platycrater Sieboldii*, 2. *Podocarpus andina*, 3. *Prunus triloba*, 1. *Quercus Buergesii*, 1. *Rosa Banksia*, 3; *R. bracteata*, 1. *Stauntonia hexaphylla*, 3; *S. latifolia*, 1. *Stewartia virginica*, 3. *Teucrium fruticans*, 1. *Vella Pseudo-cytisus*, 3; *V. parviflora (salicifolia)*, 1. *Yucca angustifolia*, 1; *Y. baccata*, 1; *Y. filamentosa*, 3; *Y. rupicola*, 1; *Y. gloriosa*, 3.

Plants uninjured—*Abelia triflora* (on N. wall), *Akebia quinata*, *Alyssum spinosum*, *Ampelopsis japonica*, *A. Roylii*, *Amsonia latifolia*, *Anchusa capensis* (self-sown seedlings), *Andromeda japonica*, *A. pulverulenta*, *Androsace lanuginosa*, *A. sarmentosa*, *Anthyllis*

erinacea, Aponogeton spathaceum, Arbutus Andrachne, A. procera, A. quercifolia, Aristolochia Kämpferi, Arthrotaxis selaginoides, Asarum virginicum, Asparagus tenuifolius, A. acutifolius, Astilbe rubra, Astragalus adurgens, A. tragacantha, Bellis cœrulescens, Bellium bellidioides, Berberis actinacantha, B. aristata, B. asiatica, Bocconia cordata, Boykinia major, Bridgeria spicata, Broussonetia Kämpferi, Buddlea globosa, Bupleurum fruticosum, Caccinia glauca, Candiandra alternifolia, Cassinia fulvida, Ceanothus azureus, C. dentatus, C. velutinus, Celtis australis, Cercocarpus ledifolius, Chamærops excelsa, Cistus Clusii, C. ladaniferus, C. populifolius, C. creticus, Clematis graveolens, C. patens, C. tubulosa, Clevera japonica, Colletia cruciata, C. horrida, Convolvulus cantabricus, C. althæoides, Cotoneaster congesta, C. Simondsii, Crocosmia aurea, Daphne oleoides, D. salicifolia (caucasica), Delphinium cardinale, D. nudicaule, Desfontainea spinosa, Enkianthus nivalis, Ephedra lomatolepis, E. monostachya, Erythrochaeta palmitifida, Eurybia Gunniana, Fabiana imbricata, Festuca altissima, F. punctoria, Fitzroya patagonica, Forsythia Fortunei, F. suspensa, Fragraria indica, Fremontia californica, Fuchsia corallina, F. discolor, F. excorticata, F. gracilis, F. pumila, F. Thompsonii, F. virginata, Garrya elliptica, Griselinia littoralis, Hamamelis virginica, Hyacinthus candicans, Hyssopus officinalis, Ilex cornuta, Illicium religiosum, Jamesia americana, Kniphofia caulescens, K. MacOweni, Kolreuteria paniculata, Limonia trifoliata (Citrus triptera), Lycium barbarum, Maclura aurantiaca, Magnolia grandiflora, M. stellata, M. Thompsonii, Montbretia Pottsii, Olea ilicifolia (Osmanthus i), Olearia Haastii, Orchis foliosa, Ourisia coccinea, Pachystigma Canbyi, P. myrsinites, Parrotia persica, Periploca græca, Petalostemum candidum, P. violaceum, Philadelphus mexicanus, P. triflorus, Photinia serrulata, Phygelius capensis, Piptanthus nepalensis, Pterostyrax hispidum, Purshia tridentata, Rhodotyus kerrioides, Ribes fuchsoides, Rosa rugosa, Rubus biflorus, R. deliciosus, R. rosæfolius, Schizophragma hydrangioides, Sciadopitys verticillata, Skimmia oblata, all Spiræas, Styra japonica, Syringa Emodi, Veronica decussata, V. pinguifolia, Viburnum plicatum, Xanthoceras sorbifolia, Zauschneria californica, Zenobia floribunda, Z. speciosa.

1. SUSSEX—EASTBOURNE, Glenleigh.—Mr. M. K. Dixon.

Gen. Char. of Soil—Sandy loam, subsoil of clay and sand.

Alt. and Exposure—50 ft., surrounded by marsh land and much exposed to N. E. and S. W.

Rainfall—[Pevensey, dist., 3 ms. ; ht., 1ft. ; 30·31ins., on 174 days].

Date of Onset and Duration of Frost—Nov. 19th till Feb. 4th, with slight thaw on Dec. 13th and 23rd, and on Jan. 17th.

Min. Temp. and Date—Jan. 21st, 9° [too low ? Dec. 17th, 19°].

Plants injured, 1879-80—7 (1), 23 (2), 3 (3)—*Aloysia citrodora*, 1. Artichokes, globe, 2. *Aucuba japonica*, 2. *Berberis Darwinii*, 2. Broccoli, 1, 2, all destroyed excepting Veitch's self-protecting. *Buddlea globosa*, 2. Camellias, 2. Cauliflower, autumn, 1. *Ceanothus azureus*, 1. Celery, 2. *Coprosma Baueriana*, kd. to grd., 2. *Escallonia macrantha*, 2 ; *E. rubra*, 2. *Eucalyptus globulus*, 1, *Euonymus japonicus*, 2 ; *E. jap. aureus*, 3 ; *E. jap. argenteus*, 2. Fuchsias, 1. Hollies, sorts, 3. Laurel, Bay, 2. Laurel, common, 2. L. Portugal, 2. *Laurustinus*, 2. *Libonia floribunda*, 2. *Magnolia grandiflora*, *exoniensis*, 1. Onions, 2. Pampas grass, 2. *Picea Pinsapo*, 2. *Pinus insignis*, 2. Potatoes, 2. *Sequoia gigantea*, 2. *Ulmus montana*, 2. *Yucca gloriosa*, 2.

2. E. GRINSTEAD, Forest Row.—Mr. H. J. Slack.

Alt. and Exposure—407 ft. above sea and 20 to 30 ft. more or less, on N. slope of Ashdown Forest range.

Rainfall, 1879—Alt., 386 ft. ; ht., 3 ft. 7 ins. ; 33·53 ins.

Min. Temp. and Date—[Crowborough Beacon, dist., 6 ms. ; alt., 776 ft. ; Dec. 17th, 17°·6].

Plants injured, 1879-80 — 5 (1), 7 (2), 6 (3) — *Arbutus*, to grd., 2. *Berberis Darwinii*, 2. *Cercis siliquastrum*, 3. *Chamærops Fortunei*, not sheltered, 1 ; sheltered, 3. *Desfontainea spinosa*, 3. *Deutzia gracilis*, 3. *Eucalyptus globulus*, 1. *Eugenia Ugni*, 2. *Euonymus*, 2. Irises, 1, 2. Laurel, Bay, broad and narrow, where exposed to winds, 3. Laurel, common, 3 ; L. Portugal, 2. *Laurus tinus*, 3. Lilies, 1, 2. *Pinus insignis*, 2.

Plants uninjured — *Araucaria imbricata*, *Cryptomeria elegans*, *Leycesteria formosa*, *Picea Pinsapo*, *Retinospora obtusa*, *R. pisifera*.

3. HORSHAM, Newells.—Mr. C. S. Dickins.

Gen. Char. of Soil—Light.

Alt. and Exposure—340 ft. S.

Rainfall, 1879—[Leonardslee, alt., 273 ft. ; ht., 1 ft. 6 ins. ; 36·50 ins.].

Plants injured, 1879-80 — 1 (1), 2 (2), 2 (3)—Camellia, only one, 1. *Euonymus*, 3. Fuchsia, 2. Myrtle, 2. *Picea Pinsapo*, 3.

Plants uninjured—Camellias, &c.

4. MIDHURST, Chithurst House.—Capt. H. King.

Gen. Char. of Soil—(A) old garden soil ; (B) stiff loam ; (C) light sandy loam. Hythe beds of Lower Greensand.

Alt. and Exposure—(A) at foot of slope by River Rother, 110 ft. ; (B) on S. slope, 160 ft. ; (C) on N. escarpment in a gully exposed to N., 170 to 230 ft.

Rainfall, 1879—[Lynch, dist., 4 ms. ; alt., 160 ? ft. ; ht., 6 ins. ; 44·14 ins., on 125 days].

Date of Onset and Duration of Frost—Nov. 14th to Dec. 28th ; Jan. 7th to Feb. 2nd.

Min. Temps. and Dates—Dec. 17th, 15° ; Jan. 20th, 17°.

Plants injured, 1879-80—6 (1), 8 (2), 12 (3)—Arbutus Unedo, 2 (B). Buddlea Lindleyana, 2 (B). Ceanothus divaricatus, 2 (B). Cerasus ilicifolia, 2 (B). Desfontainea spinosa, 1 (A). Elæagnus reflexa, (3) B. Eugenia Ugni, 1 (B). Euonymus japonicus, 2 (B). E. jap. variegatus, 1 (B). Erica mediterranea, 3 (C). E. codonodes, 2 (C). Escallonia macrantha, 3 (B). Gleditschia triacanthos, 3 (B). Ilex latifolia, 3 (A). Laurel, Bay, 3 (B). Libocedrus Chilensis, 3 (B) ; L. Doniana, 1 (B). Myrtles, 2 (B). Olearia Haastii, 3. Passiflora cœrulea, 2 (B). Picea Pinsapo, 3 (B). Podocarpus andina, 3 (C) ; P. Chinensis, 1 (C). Solanum jasminoides, 1 (B) in 1878-9 on wall. Spartium junceum, 3 (B). Stauntonia latifolia, 2 (A). Taxodium sinense, 3 (B). Viburnum Sieboldii, 1 (B).

Plants uninjured—Akebia quinata ; Arbutus Unedo, old bushes ; Desfontainea spinosa, on stiff loam (B) ; Erica codonodes, on stiff loam (B) ; Eurybia ilicifolia ; Osmanthus ilicifolius ; Photinia serrulata ; Picea Pinsapo, on light sandy soil ; Podocarpus Chinensis, at higher level.

5. UCKFIELD, Buxted Park.—Mr. H. Prinsep.

Gen. Char. of Soil—Heavy loam.

Alt. and Exposure—193 ft. ; exposed on all sides.

Rainfall, 1879—Ht., 10 ins. ; 33·59 ins., on 178 days.

Date of Onset and Duration of Frost—Nov. 20th till Feb. 6th. Four nights only above 32°.

Min. Temps. and Dates—Dec. 7th, 6°·4 ; Jan. 29th, 8°. [temps. too low ? See No. 6. Dec. 2nd, 13°. Hayward's Heath, dist., 9 ms. ; Dec. 17th, 16°·3].

Plants injured, 1879-80—18 (1), 10 (2), 11 (3)—Acanthus, 1. Acer Negundo, variegatum, 3. Aloysia citriodora, 1. Artichoke, globe,

1. *Arundo Donax*, *versicolor*, 1. *Aucuba*, 2. *Baccharis halimifolia*, 3. *Berberis Darwinii*, 3. *Broccoli*, 1. *Catalpa syringæfolia*, *aurea*, 1. *Cupressus Lawsoniana*, *aurea*, 3. *Desfontainea spinosa*, 1. *Escallonia macrantha*, 2; *E. montevidensis*, 1. *Eugenia apiculata*, 1. *Euonymus japonicus*, *variegatus*, 1; *E. jap. latifol. alb. marg.*, 1; *E. obovatus*, 2. Fig, 2. *Genista alba*, 2. *Griselinia littoralis*, 1. *Hydrangeas*, 1. *Hypericum calycinum*, 3. *Holly*, *golden*, 3; *Do. laurifolia*, 3. *Laurel*, *Bay*, 2. *Laurustinus*, 2. *Leycesteria formosa*, 3. *Magnolias*, 3. *Mandevilla suaveolens*, 1. *Myrtle*, 1. *Olea ilicifolia*, 1. *Pampas grass*, 2. *Paulownia imperialis*, 3. *Peaches*, 2. *Pinus insignis*, 3. *Punica Granatum*, 2. *Quercus robur*, *concordia*, 1. *Roses*, *Banksian*, 1.

6. UCKFIELD, Oldlands.—Mr. E. Luckhurst.

Gen. Char. of Soil—Thin, poor, silicious loam upon the Hastings sand formation.

Alt. and Exposure—400 ft., on S. slope of forest ridge. Has some shelter by trees on N. E. and W. Wind from N. E. often does much harm in spring.

Rainfall, 1879—[Buxted Park, dist., 2 ms.; alt., 193 ft.; ht., 10 ins.; 33·59 ins., on 178 days].

Date of Onset and Duration of Frost—Nov. 20th to Dec. 28th. 17 frosts in Jan. and Feb.

Min. Temp. and Date—Dec. 2nd, 13°.

Plants injured, 1879-80—5 (1), 4 (2), 3 (3)—*Arbutus Unedo*, 2. *Artichoke*, *globe*, 1. *Arundo Donax*, 2. *Benthamia fragifera*, 1 (1878-9). *Ceanothus divaricatus*, in a somewhat exposed situation, 1. *Cistus ladaniferus*, 2. *Colletia Bictoniensis*, 3. *Escallonia illinita*, 3. *Eucalyptus globulus*, 1 (1878-9). *Fremontia californica*, 1 (1878-9). *Hydrangea Hortensea*, 2. *Myrtle*, 3.

Plants uninjured—*Abelia uniflora*, *Acer polymorphum*, *Akebia quinata*, *Aponogeton distachyon*, *Arbutus* where sheltered from N. E. winds, *Arundo conspicua*, *Aucuba japonica*, *Azara microphylla*, *Berberidopsis corollina*, *Berberis Darwinii* and other species, *Broccoli*, *Ceanothus azureus*, *Eulalia japonica*, *Euonymus japonicus*, *Elæagnus longipes*, *Escallonia macrantha*, *E. montevidensis*, *Fig*, *Garrya elliptica*, *Gunnera scabra*, *Hydrangea paniculata grandiflora*, *Bay Laurel*, *Laurustinus*, *Magnolia grandiflora*, *Pampas grass*, *Phormium tenax*, *Pinus insignis*, *Richardia ætheopica*, in ponds; *Roses*, all kinds including delicate *Tea*, on walls facing N.; *Skimmia japonica*, *Thamnocalamus Falconeri*, *Veronica salicifolia*, *Viburnum lucidum*.

7. SURREY—KEW*, Royal Gardens—Mr. G. Nicholson.

Gen. Char. of Soil—Light, on gravel.

Alt.—[Kew Obs., 19 ft.].

Rainfall, 1879—[Kew Obs., ht., 1 ft. 9 ins; 33·08 ins., on 195 days].

Min. Temp. and Date—[Dec. 7th, 13°: Chiswick, 12°].

Plants injured, 1879-80—2 (1), 21 (2), 14 (3)—*Abelia rupestris*, 2. *Agapanthus umbellatus*, 1. *Aloysia citriodora*, 2. *Aralia Sieboldii*, 3. *Arbutus procera*, 3. *Arundo conspicua*, 3; *A. Donax*, 3. *Benthamia fragifera*, 3. *Boehmeria nivea*, 2. *Ceanothus americanus*, 2; *C. azureus*, 2; *C. dentatus*, 2. *Clianthus puniceus*, 2. *Escallonia Ingrami*, 2; *E. macrantha*, 2; *E. montevidensis*, 2. *Eucalyptus globulus*, 1. *Euonymus japonicus*, 2; *E. radicans*, 2. *Fabiana imbricata*, 2. *Hydrangea arborescens*, 2; *H. Hortensea*, 2; *H. japonica*, 2; *H. Otaksa*, 2. *Leptospermum scoparium*, 2. *Lycesteria formosa*, 3. *Myrtle*, 3. *Phormium tenax*, 3. *Photinia glabra*, 3; *P. serrulata*, 3. *Physianthus albus*, 2. *Picea Pindrow*, 2. *Pinus insignis*, 2, 3. *Pittosporum Tobira*, 3. *Punica Granatum*, 3. *Rhynchospermum jasminioides*, 3. *Quercus Suber*, 3.

Plants uninjured—*Abies Douglasii*, *A. excelsa*, *A. Morinda*, Almond, *Ampelopsis hederacea*, *A. Veitchii*, *Andromeda* (all), *Araucaria imbricata*, *Arbutus Andrachne*, *A. Unedo*, *Aristolochia Siphon*, *Aucuba japonica*, *Azalea amæna*, *A. microphylla*, *Berberidopsis corallina*, *Berberis Darwinii*, *B. japonica*, *B. vulgaris*, *Biota orientalis*, *B. aurea*, *Broussonetia papyrifera*, *Buddleia globosa*, *Bupleurum fruticosum*, *Buxus balearica*, *B. sempervirens*, *Calycanthus floridus*, *Camellias*, *Castanea vesca*, *Catalpa syringæfolia*, *Cedrus Atlantica*, *C. Deodara*, *C. Libani*, *Cephalotaxus Fortunei*, *Cercis siliquastrum*, *Chamæcyparis sphæroidea*, *Chamærops Fortunei*, *Chimonanthus fragrans*, *Choisya ternata*, *Cistus ladaniferus*, *Clematis Jackmanni*, *C. montana*, *Colle'ia Bictoniensis*, *C. ferox*, *Colutea arborescens*, *Coronilla glauca*, *Cotoneaster microphylla*, *C. Simonsii*, *Crataegus oxyacantha*, fl. pl., *C. Pyracantha*, *Cunninghamia sinensis*, *Cupressus borealis*, *C. Lambertiana*, *C. Lawsoniana*, *C. sempervirens*, *C. torulosa*, *Cytisus Laburnum*, *C. scoparius*, Do., fl. pl., *Daphne collina*, *D. indica*, *D. Laureola*, *D. Mezereum*, *Desfontainea spinosa*, *Deutzia scabra*, *Elæagnus argentea*, Elm, *Erica*, *Eriobotrya*

* Accidentally omitted from the Reports from Surrey.

japonica, *Eugenia Ugni*. *Eurybia ilicifolia*, *Figs*, *Fitzroya patagonica*, *Forsythia elegans*, *F. viridissima*, *Fuchsia Riccartoni*, *Furze*, *Do.*, fl. pl., *Garrya elliptica*, *Gladiolus*, *Gleditschia horrida*, *G. inermis*, *G. triacanthos*, *Gunnera scabra*, *Habrothamnus fascicularis*, *Halesia tetraptera*, *Hibiscus syriacus*, *Holly*, *Hyacinths*, *Hypericum balearicum*, *H. Calycinum*, *Iris*, *Ivy*, *Jasminum nudiflorum*, *J. officinale*, *Juniperus communis*, *J. hibernica*, *J. recurva*, *Kalmia*, *Kœlreuteria paniculata*, *Larch*, *Bay Laurel*, *Common Laurel*, round leaved, *Caucasian and Portugal*, *Laurustinus*, *Lavander*, *Lavatera arborea*, *Leptospermum lanigerum*, *Libocedrus chilensis*, *L. viridis*, *L. decurrens*, *Ligustrum lucidum*, *L. vulgare*, *Lilac*, *Lilium auratum*, *L. excelsum*, *L. lancifolium*, *Liquidambar styraciflua*, *Lonicera japonica*, *L. Periclymenum*, *Maelura aurantiaca*, *Magnolia grandiflora*, *Menziesia polifolia*, *Medlar*, *Mulberry*, *Nandina domestica*, *Narcissus*, *Negundo fraxinifolia*, *Olearia Haastii*, *Osmanthus aquifolius*, *O. ilicifolius*, *Paliurus aculeatus*, *Pampas grass*, *Paulownia imperialis*, *Phillyrea angustifolia*, *P. media*, *Phygellus capensis*, *Picea amabilis*, *P. cephalonica*, *P. grandis*, *P. lasiocarpa*, *P. Lowiana*, *P. Nordmanniana*, *P. pectinata*, *P. Pinsapo*, *Pinus excelsa*, *P. halepensis*, *P. Laricio*, *P. pinea*, *P. sylvestris*, *Piptanthus nepalensis*, *Platanus occidentalis*, *P. orientalis*, *Podocarpus andina*, *Pyrus japonica*, *Quercus glabra*, *Q. Ilex*, *Q. robur*, *Raphiolepis ovata*, *Retinospora ericoides*, *R. Juniperoides*, *R. Lycopodioides*, *Rhus glabra*, *R. Typhina*, *Roses*, dwarfs, *H. P.*, *Standards*, *Rosemary*, *Ruscus aculeatus*, *Salisbury*, *Santolina chamæcyparis*, *Sequoia gigantea*, *S. sempervirens*, *Skimmia japonica*, *Spartium junceum*, *Taxodium distichum*, *T. sempervirens*, *Tritoma uvaria*, *Thujopsis Dolabrata*, *Thuja gigantea*, *Veronica Traversi*, *Vines*, *Walnuts*, *Weigela rosea*, *Wistaria sinensis*, *Yucca filamentosa*, *Y. gloriosa*.

DIVISION III.—S. MIDLAND COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM BEDFORDSHIRE, BUCKINGHAMSHIRE, CAMBRIDGESHIRE, HERTFORDSHIRE, HUNTINGDONSHIRE, NORTHAMPTONSHIRE AND OXFORDSHIRE.

BEDS. *Rainfall*, great during the summer, combined with a low temp. and absence of sun (Biggleswade). Excepting 1875, this is the wettest year since 1852 (Bedford). *Min. rainfall*, Cardington, alt., 142 ft.; ht., 36 ft.; 24·21 ins.; Do., alt., 106 ft.; ht., 0 ft. 0 ins.; 29·10 ins., or 7·06 ins. above av. of 20 years. *Max.*, Biggleswade, ht., 1 ft. 3 ins.; 30·50 ins., on 150 days. *Min. temps.*, Cardington, alt., 109 ft.; Dec. 7th, 2°; Aspley Guise, alt., 433 ft.; 10°·4.

Plants injured, 1879-80—4 (1), 16 (2), 4 (2), at 1 place.

BUCKS. *Rainfall*, great for first 9 months; 28·50 ins., or nearly 4 ins. more than in same period of the wet year, 1872. The last 3 months gave only 2·33 ins. (Addington). 8·25 ins. above av. of 8 yrs. (Langley). *Min. rainfall*, Olney, ht., 8 ins.; 27·12 ins.: *Max.*, Aylesbury, alt., 280 ft.; ht., 1 ft.; 39·25 ins., on 181 days. Vegetation of all kinds suffered very much from the excessive rainfall, want of sunshine and low temp. Permanent injury has probably been done to some trees, as Peaches, the wood never getting ripe; leaves not shed on Dec. 31st. Many floods causing loss of hay (Addington). *Min. temp.*, Addington, alt., 309 ft.; Dec. 7th, 5°.

Plants injured, 1879-80—68 (1), 14 (2), 24 (3), total at 4 places.

CAMBS. *Rainfall*, very heavy, May to Aug.; but much below av. for the last 3 months (Cambridge); about 3 ins. above av. of 7 yrs. (March). *Min. rainfall*, Chatteris, ht., 1 ft.; 21·56 ins., on 228 days: *max.*, Caxton, alt., 127 ft.; ht., 1 ft.; 32·83 ins. Harvest very late and deficient (Cambridge). *Min. temps.*, Babraham Hall,* Dec. 7th, 6·30 a.m., -7° [too low?]. Cambridge, alt., 40 ft.; Dec. 7th, -1°: Do., alt., 90 ft.; 0°. Royston, alt., 274 ft.; Dec. 7th, 11°·6.

* *Gard. Chron.* 1879, p. 765.

Plants injured, 1879-80 — 43 (1), 38 (2), 16 (3), total at 2 places.

HERTS. *Rainfall*, for the fifth year in succession, exceptionally heavy; total, about 10 ins. above av. (Watford). The last 3 months remarkably dry (Berkhampstead). *Min. rainfall*, Ware, alt., 114 ft.; ht., 3 ft.; 26·35 ins., on 166 days: max., Gt. Berkhamstead, alt., 370 ft.; ht., 1 ft. 5 ins.; 34·90 ins., on 177 days, or 6·24 ins. above av. of 20 yrs. *Min. temps.*, Much Hadham, alt., 200 ft.; Dec. 7th, -3°: Harpenden, alt., 409 ft.; 5°·4: Watford, alt., 225 ft.; 7°·6.

Plants injured, 1879-80—22 (1), 33 (2), 23 (3), total at 6 places.

HUNTS. *Rainfall*, excessive, succeeded by severe frost (Godmanchester). *Min. rainfall*, Whitsea Mere, ht., 1 ft.; 26·08 ins., on 200 days: max., Huntingdon, alt., 52 ft.; ht., 4 ins.; 31·89 ins., on 181 days.

Plants injured, 1879-80—35 (1), 39 (2), 16 (3), total at 2 places.

NORTHAMPTONSHIRE. *Rainfall*, great from May to Sept., with low temp., and want of sunshine (Hargrave). Althorp, alt., 310 ft.; ht., 3 ft. 10 ins.; 4·40 ins. above av. of 20 years (Northampton). *Min. rainfall*, Peterborough, alt., 32 ft.; ht., 1 ft.; 21·86 ins., on 125 days: max., Banbury, alt., 580 ft.; ht., 1 ft.; 33·52 ins., on 172 days. Hay greatly damaged, harvest deficient (Castle Ashby); weather very disastrous to all crops (Easton Neston). *Min. temps.*, Archfield, Wellingborough, Dec. 7th, 0°: Barton Seagrave, Dec. 5th, 0°: Northampton, alt., 253 ft.; Dec. 6th, 11°.

Plants injured, 1879-80—49 (1), 66 (2), 26 (3), total at 7 places.

OXFORDSHIRE. *Rainfall*, continuous during the six summer months, with absence of sun and low temp. (Bloxham, Broughton, &c.). Disastrous to agriculture, &c. *Min. rainfall*, Oxford Obs., alt., 231 ft.; ht., 24 ft.; 27·60 ins., on 169 days: max., Henley-on-Thames, alt., 370 ft.; ht., 1 ft. 8 ins.; 37·29 ins. *Min. temps.*, Oxford, alt., 210 ft.; Dec. 7th and 8th, 12°; Broughton, alt., 442 ft.; 7°·6.

Plants injured, 1879-80—7 (1), 18 (2), 12 (3), total at 2 places.

REPORTS.

1. BEDS. SANDY and Girtford.—Mr. T. Laxton.

Gen. Char. of Soil—Sandy and light where the frost was most severe; but of a clayey loam overlying drift clay, in the greater portion of the E. side of Beds. A good deal of which is within or approximate to the valleys of the rivers Ouse and Ivel.

Alt. and Exposure—About 80 ft., exposed principally to N. E., N., and S. W.; sheltered on parts of E. and S. E. by a range of sandy hills. The garden is well sheltered by trees and is also walled, but close to the river.

Rainfall, 1879.—[See Meteorol. Obs., Cardington, dist., 5 ms.].

Date of Onset and Duration of Frost—Nov. 20th, after a short thaw on 24th, frost permanently set in on 26th, and lasted till Dec. 27th.

Min. Temp. and Date—Dec. 6—7, -3° (Sandy); the S. W. wind being accompanied by frozen mist. [Cardington, Dec. 7th, 20].

Plants injured, 1879-80—4 (1), 16 (2), 4 (3)—Apples, only Old Hawthornden, 2. Arbutus Unedo, 2. Aucuba japonica, var., 3. Box, 3. Cedrus Deodara, 1, 2. Cherries, 2. Escallonia macrantha, 1, 2. Hollies, 2; Do., silver var., 2. Laurel, Bay, 2. Laurel, common, 2; Do., Portugal, 2. Laurustinus, 2. Magnolia grandiflora, 3. Pears, Beurré de l'Assumption and several others, 2. Plums, 2. Quince, Portugal, 2. Roses, 1, 2, 3 (see below), Sequoia gigantea, 1, 2.

Observations—Local elevation, proximity to, the influence of the river, and variations of shelter and exposure seem to have more to do with the severity of the frost and its effects, than the *general* elevation of the district. The frost of Dec. 1879 appears to have been more severely felt at Sandy Rectory (where the temperature fell to -3°). The same result was noticeable in 1860, and on one occasion subsequently. The frost, when the temp. was at its minimum, was accompanied by frozen mist which adhered to and covered the trees. In 1860 a Silver Holly more exposed to the E. was on that occasion cut down to the ground; the same tree in 1879 being only slightly injured, whilst another tree of the same variety, less exposed to the E. and more exposed to the S. W. on the former winter was

only slightly injured, but in 1879 was cut down to the ground. At Old Warden, Bay Laurels near the hall were killed to the ground, whereas near the church, within a short distance, but at a somewhat higher elevation, they were uninjured: near Bedford, the effect of a rise of only a few feet was especially noticeable on the common Laurel. Similar results were also noticeable with Hollies in Bedford; the foliage of which in the lower part of the town was quite killed; whereas in the higher parts it remained green through the year.

Fruit Trees—In the young wood, especially of the gross growing Pears, the pith was found to have become browned. In all such cases of Pears as well as of nearly all Cherries and Plums, the grafts had been inefficiently made last spring. *Roses* (at Girtford)—The old wood of most of the H. P.'s was much injured, also that of the wild Dog-rose, the pith of many stocks of the latter being brown right down to the ground line, even where the outer bark appeared healthy and the wood well ripened. [See report by Mr. Noble, p. 15, and by Mr. Hogg, p. 17.] The effects of the frost are still apparent (Nov. 1880); branches continuing to die off the H. P.'s. Noticeable exceptions, however, are Baroness Rothschild, Edward Morren, Emily Laxton, John Hopper and Julius Margottin; but *Cristata*, *Souvenir de la Malmaison*, various Summer Roses, and *Village Maid* were much injured. Of *Teas* and *Noisettes*, injured, were, *Cloth of Gold*, 1; *Marie Van Houtte*, 1, 2; and *Niphetos*, 1, 2. All the dormant buds of the above varieties, whether standards or dwarfs, were killed, and nearly all those worked with. *Maréchal Niel*, 1, 2; *Souvenir d'Elise*, 1, 2; many older plants of all the above varieties under shelter of fences were either entirely killed or killed to the ground line. The following were only slightly or partially injured—*Catherine Mermet*, *Celine Forestière*, *Fortune's White*, *Fortune's Yellow*, *Homere*, *Madame Margottin*, *Madame St. Jamain*, *Souvenir de Paul Neyron*, *Triomphe de Rennis*, *Belles Lyonnaise* and *Souvenir d'un Ami* appear to be very hardy Tea-roses. The following appear to be as hardy as the best of the H. P.'s, and even as the Dog-rose. They were in many cases quite unprotected and withstood the frost, both on light and strong land—*Bouquet d'Or*, *Gloire de Dijon*, *Madame Berard*, *Madame de Vatry*, *Maréchal Brigeaud* and *Marie Guillot*.

1. BUCKS—AYLESBURY, Mentmore.—Mr. Jas. Smith.

Gen. Char. of Soil—Clay loam and chalk.

Alt. and Exposure—420 ft. ; S. by W. and S. by E.

Rainfall—27·96 ins.

Min. Temp. and Date—Dec. 11th, 7°.

Plants injured, 1879-80—13 (1), 10 (2), 20 (3)—*Æsculus laci-niata*, 3. *Ailanthus glandulosa*, 3. Almond, 3. *Aralia Sieboldii*, 1, 2. *Arbutus Unedo*, 3. *Benthamia fragifera*, 1. *Berberis Dar-winii*, 3. *Betula pendula*, 3. *Buddlea globosa*, in a shaded position, 1. *Catalpa aurea*, 1 ; *C. syringæfolia*, 3. *Cephalotaxus Fortunei*, 3. *Cercis siliquastrum*, 3. *Chamæcyparis glauca*, 3. *Chimonanthus fragrans*, 3. *Cistus ladaniferus*, 1. *Colletia ferox*, 2. *Cupressus Goveniana*, 1 ; *C. macrocarpa*, 1 ; *C. sempervirens*, 2. *Escallonia macrantha*, 2 ; *E. rubra*, 1. *Garrya elliptica*, 2. *Gaultheria Shal-lon*, 3. *Gleditschia horrida*, 3 ; *G. inermis*, 3. *Hippophaë rham-noides*, 3. *Hydrangea*, 2. *Hypericum calycinum*, 1, 2. Laurel, Bay, 2. Laurel, common, 3. *Laurustinus*, 1. *Leycesteria for-mosa*, 2. *Ligustrum lucidum*, 3. *Lonicera fragrantissima*, 3. *Magnolia grandiflora*, 1. *Pinus insignis*, 1. *Rhus typhina*, 3. *Robinia Pseud-Acacia, aurea*, 1 ; *R. P. inermis*, 3. *Thuja P. aurea*, 2.

Observations—Where the ground is dry the plants of *Hypericum* were not so much injured ; but where it is damp they were killed. Some of the Bay Laurels, though cut to the ground, have come up again.

2. BLETCHLEY, Brickhill Manor.—Mr. G. Bloxham.

Gen. Char. of Soil—Light, shallow and very sandy, resting upon the New Red-sandstone rock.

Alt. and Exposure—Nearly 300 ft., much exposed to S. W., shel-tered on N. and N. E.

Rainfall, 1879—[See No. 4, Addington Manor, dist., 10 ms.].

Date of Onset and Duration of Frost—Nov. 28th till Dec. 27th. Frost recommenced Jan. 18th and lasted till Feb. 3rd, 1880.

Min. Temp. and Date—Dec. 7th, 15° ; Jan. 28th, 18°. (On Jan. 1st, 1880, temp. was 50° at 10 p.m.).

Plants injured, 1879-80—Broccoli, 3. Laurels, 3. *Sequoia gigantea*, 3.

Observations—Very few can write in such favourable terms of the wet summer of 1879, and the severe winter of 1879-80 as I am able

to do. Not one single shrub of any kind was killed during those long frosts and very few were injured. It is easily accounted for, as our drainage is so perfect that water is immediately absorbed by the beds of Red sand that lie about 18 inches below the surface. Consequently the roots of all trees, shrubs &c. are warm and dry in winter. Our situation being high and with such perfect drainage, we seldom get too much rain; therefore we thrive much better in a wet season than in a dry one. Even during the very wet summer of 1879 all vegetation made wonderful progress and with very few exceptions we had but little reason to complain even of that exceptionally wet season. Long continued drought is more detrimental to all vegetation here than the hardest of winters.

3. TRING, Drayton-Beauchamp.—Rev. H. H. Crewe.

Gen. Char. of Soil—Stiff clay on the top of chalk.

Alt. and Exposure—365 ft.

Rainfall, 1879—[Aylesbury, dist., 5 ms.; alt., 280 ft.; ht., 1 ft.; 39.25 ins., on 181 days].

Min. Temp. and Date—[Berkhampstead, dist., 5 ms.; alt., 370 ft.; Dec. 7th, 7°].

Plants injured, 1879-80—40 (1), 1 (2), 0 (3)—*Adonis pyrenaica*, 1. *Anemone narcissiflora*, 1; *A. vitifolia*, 1. *Aster grandiflorus*, 1; *A. sericeus*, 1. *Barbarea vulgaris*, fl. pl., 1. *Bellis rotundifolia*, *cœrulescens*, 1. *Brugmansia lutea*, 1; *B. sanguinea*, after 4 winters, 1. *Campanula pyramidalis*, 1. *Cheiranthus* sp., 1. *Cistus*, wiry shrubby sp., 1. *Erodium caruifolium*, 1. *Exochorda grandiflora*, 1. *Gaillardia bicola*, 1. *Gillenia stipulacea*, 1. *Kniphofia quartiniana*, 1. *Lathyrus latifolius*, *albus*, 1. *Lobelia syphilitica*, 1. *Malva campanulata*, 1; *M. lateritia*, 1. *Mimulus alatus*, 2. *Oxalis Deppei*, 1; *O. lasiandra*, 1. *Oenothera anisoloba*, 1.; *O. taraxifolia*, 1. *Orobis varius*, 1; *O. albus*, 1. *Pampas grass*, 1. *Pastinaca lucida*, 1. *Rosa berberidifolia*, 1. *Roses*, *Tea*, 1. *Ruta albiflora*, 1. *Salvia interrupta*, 1. *Scilla Lilio-Hyacinthus*, 1. *Teucrium Arduini*, 1. *Trichonema speciosum*, 1. *Tritoma*, all, 1. *Veronica*, all shrubby species, except *V. Traversi*, 1. *Viola gracilis*, 1; *V. Rothomagensis*, 1.

4. WINSLOW, Addington Manor.—Mr. T. Mathison.

Gen. Char. of Soil—Generally clay, with patches of gravelly soil, with subsoil of stiff tenaceous clay, holding a great deal of water in spite of drains.

Alt. and Exposure—309 ft. above sea. Open, on the top of a

ridge, sloping gently away to S., also to N. and W.

Rainfall, 1879—Alt., 309 ft.; ht., 1 ft.; 30·83 ins., on 189 days; or 1·36 ins. above the av. of previous 5 yrs.

Date of Onset and Duration of Frost—Nov. 20 until Dec. 27. Frost every night except two. On 14th, 15th and 16th, temp. was 23°, 19°, 20°, respectively; then a few nights open. After Dec. 27 no very low temp. occurred until Jan. 26th, when five nights of sharp frost occurred.

Min. Temp. and Date—Dec. 7th, 5°, by shaded thermometer; 0° on the grass.

Plants injured, 1879-80—15 (1), 3 (2), 1 (3)—*Arbutus Unedo*, 1, 2. *Cercis siliquastrum*, 2. *Cistus ladaniferus*, 1. *Cupressus macrocarpa*, 3. *Escallonia macrantha*, 1. *Griselinia littoralis*, 1. *Hypericum nepalense*, 1. Laurel, Bay, 1. *Laurustinus*, 1. *Ligustrum coriaceum*, 1. *Maclura aurantiaca*, 2. *Osmanthus aquifolius*, 1. Pampas grass, 1. *Pinus insignis*, 1. *Podocarpus andina*, 1. *Quercus Ilex*, 1. *Raphiolepis ovata*, 1. *Tritoma uvaria*, 1.

Observations—Trees and shrubs have especially suffered. *Escallonia macrantha*, excepting two or three on walls which were however much injured, were all killed in the winter of 1878. Every plant of *Griselinia littoralis* was also killed by the winter of 1878. Bay Laurels, every one, young and old, were killed. *Laurustinus*, nearly every specimen being a fine large plant, all were killed. Of *Pinus insignis* every tree from 3 to 10 ft. perished. Of *Quercus Ilex*, while all were very much injured, many young plants, 10 yrs. old, and 8 to 10 ft., were killed. Peaches here appear to have been failing for two or three years, but I think more owing to the want of sun and the large rainfall than to the intense frost. The trees and shrubs generally were in a very bad condition from the same cause for resisting the intense frost of the winter of 1879-80.

1. CAMBRIDGESHIRE — CAMBRIDGE, Botanic Gardens. — Mr. R. Irwin Lynch.

Gen. Char. of Soil—Light, on gravel.

Alt. and Exposure—[About 50 ft. ?] Protected by houses and trees on N. Ground sloping to W. Country moderately open.

Rainfall, 1879—28·68 ins. Annual mean being about 22·5 ins.

Date of Onset and Duration of Frost—Dec. 2nd, 20°.

Min. Temp. and Date—Dec. 7th, -1°.

Plants injured, 1879-80—22 (1), 29 (2), 3 (3)—*Arbutus Unedo*, 1; *A. hybrida*, 1. *Aristotelia Macqui*, 1. *Arundo Donax*, 2. *Aucuba japonica*, 3. *Berberis Darwinii*, 2. *Buddlea globosa*, 1. *Buxus balearicus*, 1. *Chamærops Fortunei*, 2. *Colletia ferox*, 2. *Conifers*—*Cedrus Atlantica*, slightly browned, 3; *C. Deodara*, 2, especially in the lower part of the garden. *Cupressus excelsa*, 1; *C. fragrans*, 2; *C. funebris*, 1; *C. Lawsoniana*, 2; *C. macrocarpa*, 1; *C. sempervirens*, killed on N. and N. E. sides, 2. *Picea amabilis*, old plants, 3, young plants 1; *P. Pindrow*, 3. *Pinus Halepensis*, 1; *P. insignis*, 1; *P. Pinea*, 1.—*Colletia ferox*, 2. *Coriaria myrtifolia*, 2. *Danaë racemosa*, 2. *Dracæna australis*, 1. *Durana dentata*, 8 ft. high, 1; *Ephedra distachya*, 3. *Eryobotrya japonica*, on rockwork, 1. *Escallonia macrantha*, 2. *Euonymus japonicus*, 1. *Fuchsia gracilis*, 2; *F. Riccartoni*, 2. *Furze*, 2. *Garrya elliptica*, 2. *Hydrangea Hortensea*, 2. *Ilex Perado*, removed from greenhouse, 1. *Jasminum revolutum*, 1. *Laurel*, common, 2; *L. Portugal* (the harder), 2. *Laurustinus*, 2. *Leycesteria formosa*, 1. *Pampas grass*, 2. *Phillyrea angustifolia*, 2; *P. media*, 2. *Punica Granatum*, 2. *Quercus Ilex*, 2; *Q. pseudococcifera*, 2; *Q. Thomasi*, 1. *Reineckia carnea*, removed from greenhouse, 1. *Ribes speciosa*, 2. *Smilax ovata*, 2. *Spartium junceum*, 2. *Teucrium aureum*, removed from greenhouse, 1. *Vitex Agnus-Castus*, 2.

Plants uninjured—*Aralia Sieboldii*, *Asimina triloba*, *Cistus ladaniferus*, *Hydrangea arborescens*, *H. quercifolia*, *Nerine Fothergillii*, *Reineckia carnea*, *Selaginella Kraussiana* (below level of grd.), *Teucrium aureum*, *Thujopsis dolabrata*, *Vitex incisa*, *Yucca aloifolia*.

Observations—The protection of trees from ground radiation, if such it is, has been very conspicuous with several species. *Picea Pindrow*, while killed a foot from the ground, was quite uninjured below that mark. *Deodars* were scarcely in any case injured below one foot, and, in some cases, eighteen inches; above that height they were killed or greatly disfigured; about one-half will be of further service. *Laurustinus* showed a similar appearance. With the exception of *Laurels* and *Chamærops*, the leaves of the latter being all killed, all those numbered 2 were killed to the ground, but have since grown well. With regard to the *Ephedra*, the younger branches were disarticulated in showers, no injury being received further back. This disarticulation is not due to exceptionally severe frost, but it is a throwing off, no doubt, of the unripe younger growths.

Garrya had many branches killed back. The shrubs required cutting rather more than half way back. The Pampas grass had all the leaves completely killed, the shoots surviving only in part.

2. CAMBRIDGE, Pampisford.—Mr. T. Morley.

Gen. Char. of Soil—A stiff loam mixed with chalk and gravel.

Alt. and Exposure—W., N. and E., but not so much on S.

Rainfall—29·97 ins.

Date of Onset and Duration of Frost—Nov. 3rd to Jan. 1880.

Min. Temp. and Date—Dec. 7th, 1°.

Plants injured, 1879-80—21 (1), 19 (2), 13 (3)—*Arbutus*, 1. *Bignonia grandiflora*, 2. *Cistus ladaniferus*, 1. *Conifers*—*Abies Menziesii* (Sitchensis), 3. *Cedrus Deodara*, *argentea*, 1; *C. D. crassifolia*, 3; *C. D. verticillata*, *glauca*, 3; *C. D. viridis*, 2. *Cupressus Corneyana*, 1; *C. Goveniana*, 1; *C. G. glaucescens*, 1; *C. Knightiana* (*elegans*), 1; *C. Lawsoniana*, *alba*, *spica*, *pendula*, 3; *C. Lusitanica*, 1; *C. macrocarpa*, 1; *C. M. Crippsii*, 1; *C. thurifera* (*Uhdenea*), 2; *C. Whitleyana*, 1. *Libocedrus chilensis*, 1; *L. viridis*, 1. *Picea bracteata*, 2; *P. firma*, 3; *P. Numidica*, 3; *P. Pinsapo*, 3; *P. P. variegata*, 3. *Pinus Benthamiana* (*Sinclairii*), 1; *P. Brutea*, 1; *P. Don Pedri*, 1; *P. excelsa*, 3; *P. Halepensis*, 1; *P. Hartwegii*, 2; *P. insignis*, 1; *P. Lambertiana*, 3; *Podocarpus andina*, 1. *Retinospora ericoides*, 1; *R. juniperoides* (*dubia*), 1. *Sequoia gigantea*, *variegata*, 3; *S. sempervirens*, 3; *S. s. alba spica*, 3. — *Fitzroya patagonica*, 2. *Garrya elliptica*, 2. *Laurel*, common, 2. *Laurustinus*, 2. *Photinia serrulata*, 2. *Quercus Suber*, 2.

1. HERTFORDSHIRE—CHESHUNT.—Mr. G. Paul.

Gen. Char. of Soil—Alluvial loam or "Brick earth."

Alt. and Exposure—60 to 75 ft.; valley fairly wooded.

Rainfall, 1879—[Waltham Abbey, Gunpowder Fac., dist., 2 ms.; alt., 82 ft.; ht., 4 ft.; 28·83 ins., on 121 days].

Min. Temp. and Date—[Dec. 7th (?)], 2°.

Plants injured, 1879-80—14 (1), 19 (2), 11 (3)—Apples, young nursery standards, 3 (stems in some cases were cankered in succeeding season). *Aralia spinosa*, 2. *Artichokes*, globe, 1, 2. *Asparagus*, 2. *Azara microphylla*, 2. *Bambusa*, 2. *Cistus ladaniferus*, 3. *Colletia ferox*, 2, 3. *Conifers*—*Arthrotaxis laxifolia*, 1. *Cedrus Deodara*, 1, 2, 3, some unhurt. *Cupressus macrocarpa*, 1. *Dacrydium* sp., 1.

Picea Pinsapo, 2, 3. *Pinus devoniana*, 1; *P. insignis*, 1. *Podocarpus alpina*, 2; *P. Andersoni*, 2.—*Escallonia*, 2. *Euonymus japonicus*, 2. *Figs*, 2. *Indigofera Dosua*, 2. *Laurel Bay*, 2. *Magnolia grandiflora*, 1. *Mulberry*, 2. *Olearia Haastii*, 2. *Pampas grass*, 1, 2. *Phillyrea*, 3. *Plane*, 3. *Raphiolepis ovata*, 1. *Roses*, 1, 2, 3—Tea scented, dwarf varieties, most sorts killed; the following cut to the ground—*Belle Lyonnaise*, 2; *Devoniensis*, 2; *Gloire de Dijon*, and its races, 3; *Jean Ducher*, 3; *Lamarque*, 1; *La Reine*, 1, 2; *Madame Margottin*, 2; *Madame Willermoz*, 2; *Maréchal Niel*, 1; *Marie von Houtte*, 2; *Victor Verdier*, 1, 2.—*Spartium junceum*, 3. *Yuccas*, 3.

2. HARPENDEN and ROTHAMSTEAD.—Sir J. B. Lawes and Dr. Gilbert.

Gen. Char. of Soil—Loam, yellow clay and chalk.

Alt. and Exposure—Harpenden, 400 ft.; Rothampstead, 420 ft.

Rainfall, 1879—36·03 inches; max. in Aug., 6·56 ins.; min. in Nov., ·81 ins. Average yearly rainfall for 25 years, 1854—1878, 27·72 ins.

Date of Onset and Duration of Frost—Nov. 14 to 16, more or less frosty till end of Nov.; Dec. was frosty almost without interruption till 28th. Temp. being below freezing pt. on 25 occasions; below 20° six times. Mean max. temp. for Dec., 36°·1; mean min., 25°·1. From Dec 28 to Jan. 4, there was no frost; but temp. was below freezing point every day till Jan. 31; the Min. being 15°·2 on 28th. Mean max. temp. for Jan., 1880, was 37°·0. Mean min., 27°·9.

Min. Temp. and Date—Dec. 7th, 5°·2.

Plants injured, 1879-80—I do not think that any plant or tree has been killed. Ivy growing upon some of the tall trees has lost some of the leaves, but is growing again. A *Magnolia* about 25 ft. high growing against the house facing S. E. has suffered the loss of leaves and looks sickly. Of *Roses*, *Gloire de Dijon*, *Maréchal Niel* and others upon the house have not suffered. *Laurustinus*, all much injured, some so much that they were cut down, but these have all shot up again from the bottom, whilst those that were left are mostly recovering. At Rothampstead, only one mile distant, but 20 ft. higher, the *Laurustinus* scarcely suffered at all.

3. HATFIELD, Brookman's Park.—Mr. A. Grant.

Gen. Char. of Soil—Heavy yellow clay mixed with gravel.

Alt. and Exposure—412 ft. Sheltered on N. and E.

Rainfall, 1879 — [Hatfield, 3 ms. (Brockett Hall); ht., 1 ft.; 28·91 ins., on 170 days].

Min. Temp. and Date—[Probably Dec. 7th, about 7°*].

Plants injured, 1879-80—5 (1), 8 (2), 4 (3)—Amaryllis Belladonna, 1. Arundo Donax, 2. Artichoke, globe, 2. Asparagus, 2. Broccoli, 1, 2; about 10 p. c. saved. Euonymus, 1. Figs, 2. Hydrangeas, 3. Pampas grass, 1, 2, 3. Peaches, planted autumn 1879, 1, 2, 3; Alexandra noblesse, 2; Alice, 1; Diamond, 2; Dr. Hogg, 3; Goshawk, 2; Lord Palmerston, 2; Prince of Wales, 2; Stirling Castle, 1; Violette Hatin, 3.—Quercus concordia, newly planted, 1; Q. Lucombeana, 3. Retinospora, 2. Roses, about 10 p. c., 1; Maréchal Niel, 2. Schizostylis, 2. Tritoma, 2.

4. SOUTHGATE, The Lawns.—Mr. H. P. Church.

Altitude—240 ft.

Rainfall, 1879—Ht., 8 ins.; 33·52 ins., on 235 days.

Min. Temp. and Date—[Colney Hatch., dist., 1½ ms.; Dec. 7th, 6°·8].

Plants injured, 1879-80—A Judas tree here, probably 100 years old, showed no blossom at the usual time, but quite late in the summer it threw out a few isolated blossoms. I noticed in the Jardin des Plants, Paris, in Sept. 1879, men engaged in digging up splendid specimens of the Judas tree, stated on the labels to have been planted in Buffon's time, damaged in 1868 by frost and again in [Jan. ?] 1879, fatally, it seems. An old Mulberry tree produced no fruit this [last ?] year here (May 23, 1880).

5. WELWYN, Brockett.—Mr. W. Gurney.

Gen. Char. of Soil—Light loam.

Alt. and Exposure—Valley of Lea; aspect due S.

Rainfall, 1879—28·91 ins., on 170 days.

Date of Onset and Duration of Frost—Oct. 28th, six days.

Min. Temp. and Date—[Harpenden, dist., 6 ms.; Dec. 7th, 5°·2].

Plants injured, 1879-80—3 (1), 3 (2), 3 (3)—Apples, 2. Apricots, 3. Magnolia, 2. Nectarines, 1, 3. Peaches, 1, 3. Roses, 2. Vinca, 1.

Plants uninjured—Apples—Duchess of Oldenburg, Cox's Pomona, Braddick's Nonpareil, Cox's Golden Drop, Sturmer Pippin.

6. WELWYN, Codicote Lodge.—Mr. J. Stevens.

* At Harpenden, Dec. 7th, 5°·2; Watford, 7°·6; Berkhamstead, 7°.

Gen. Char. of Soil—A cool loam.

Rainfall — [Knebworth, dist., 2 ms.; alt., 407 ft.; ht., 1 ft.; 31·38 ins., on 171 days].

Min. Temp. and Date—[Harpenden, dist., 5 ms.; Dec. 7th, 50°2].

Plants injured, 1879-80—3 (1), 2 (2), 3 (3)—Artichoke, globe, 2. Broccoli, all kinds, 1. Celery, 2. *Fruit trees* of all sorts, 3. Pampas grass, 3. Parsley, 1. *Shrubs*, 3. Tritoma, 1.

1. HUNTS—HUNTINGTON, Godmanchester—Mr. E. W. Hunnybun.

Gen. Char. of Soil—A stiff blue clay, consisting of deposits of alluvium and river gravel in the valley of the Ouse.

Rainfall—[Farm Hall, 28·05 ins., on 156 days].

Min. Temp. and Date—[See No. 2. Houghton, dist., 2 ms.].

Plants injured, 1879-80—26 (1), 33 (2), 11 (3)—*Abies Morinda*, 2. *Antirrhinums*, 1; *Aralia Sieboldii*, 1; *A. spinosa*, 1. *Araucaria*, 3. *Arbutus*, 2. *Aucuba*, 2, 3. *Berberis Darwinii*, 2. *Buxus balnearicus*, 1. *Catalpa Kämpferi*, 2. *Cedrus Deodara*, 1, 2, 3; *C. Libani*, 3. *Cephalanthus canadensis*, 1, 2. *Clematis montana*, 1, 2, 3. *Colletia spinosa*, 1. *Cryptomeria elegans*, 2. *Daphne pontica*, 2. *Escallonia Ingrami*, 1; *E. macrophylla*, 1. *Euonymus japonicus*, *aureus variegatus*, 1; *E. j.*, *macrophyllus*, 1; *E. j. m. aureus*, 1; *E. j. ovatus*, *aureus marginatus*, 1; *E. radicans*, *variegatus*, 2. *Fuchsias*, 2. *Furze*, fl. pl., 2. *Garrya elliptica*, 2; others uninjured. *Jasminum officinale*, 1, 2, 3. *Juglans regia*, 3. *Koeleruteria paniculata*, 2. *Laurel*, Bay, 2, 3. *Laurel*, common, young 3; and old, 2. *L. Portugal*, 2, 3. *Ligustrum lucidum*, 1. *Lonicera*, evergreen, 1. *Paliurus aculeatus*, 2. *Pampas grass*, 2. *Pears*, 3. *Penstemons*, 1. *Phillyrea*, 1, 2. *Photinea serrulata*, 1. *Pinus excelsior*, 2; *P. macrocarpa*, 1, 2. *Quercus Ilex*, 1, 2, 3. *Rhamnus alaternus*, 2. *Roses*, H. P., 1, 2, 3; Tea, 1, 2; *Maréchal Niel*, nearly all, 1. *Rosemary*, 1. *Taxodium sempervirens*, 3. *Wall-flowers*, 1. *Yew*, two only out of 109, 1.

Observations—The frost in the Ouse valley is always more intense by several degrees than on the uplands about a mile distant, which rise to 100 ft. Many of the plants mentioned above were uninjured on the higher ground. Of the above, those uninjured in the valley were :—*Cedrus Deodara*, in one instance; *Deutzia gracilis*, and 107 out of 109 Yews planted in the autumn.

2. HUNTINGDON, Houghton.—Mr. T. Tilbrook.

Gen. Char. of Soil—Light loam resting on gravel.

Alt. and Exposure—Very flat and open, about 250 yards from the river Ouse.

Rainfall, 1879—[Huntingdon, alt., 52 ft.; ht., 4 ins.; 31·89 ins., on 181 days].

Date of Onset and Duration of Frost, 1879-80 — Nov. 14, 22°. The frost began to break up on Dec. 28th.

Min. Temp. and Date—Dec. 10th [7th ?], 1°.

Plants injured, 1879-80—9 (1), 6 (2), 2 (3)—Arbutus, 1. Broccoli, 1. Cedrus Deodara, 2. Euonymus, 1. Laurel, Bay, 1. Laurel, common, 2. Laurustinus, 2. Lettuce, 2. Magnolia, 1. Mulberry, 2. Pinus insignis, 1. Quercus Ilex, 3. Roses, Tea and H. P., 1; 2, 3. Sequoia gigantea, 2. Yuccas, 1.

Observations — In a cool peach house, the wood was very imperfectly ripened; hence a small crop. Out-door Peaches ripened badly and bore no fruit in 1880.

3. PETERBOROUGH, Orton Hall.—Mr. A. Harding.

Gen. Char. of Soil—A good loam, rather heavy; subsoil, of gravel.

Alt. and Exposure—Well sheltered.

Rainfall, 1879—[Peterborough (Westgate), alt., 32 ft.; ht., 1 ft.; 21·86 ins., on 125 days].

Date of Onset and Duration of Frost—Nov. 8th to Jan. 1880.

Min. Temp. and Date—Dec. 9th, 4°.

Plants injured, 1879-80—11 (1), 21 (2), 10 (3)—Antirrhinum, 2. Apricots, 3. Artichokes, globe, 2. Arundo conspicua, young, 1. Berberis Darwinii, 3; B. japonica, 2. Broccoli, 1. Cabbages and Savoys, 2. Cherries, 3. Cotoneaster Simmonsii, 2. Cupressus macrocarpa, 1, 2. Cyclamen, 1. Endive, 2. Figs, 2. Fuchsia Riccartoni, 2. Holly, 1, 3. Laurel, Bay, 3. Laurel, common, 2. Lettuce, 3. Nectarines, 2. Pampas grass, 1, 2. Peaches, 2. Penstemons, 1. Phormium tenax, 2. Picea bracteata, 3; P. insignis, 2; P. Llaveana, 1; P. Pinsapo, 3. Quercus Ilex, 2. Roses, H. P., 2; Tea, 2. Sage, 2. Sequoia gigantea, 1, 3. Thuja sempervirens, 3. Thyme, 2. Tritoma uvaria, 2. Wallflowers, 3. Zauchneria californica, 1.

Plants uninjured—Buddlea Lindleyana, Calla æthiopica, Currants (crop abundant), Gooseberries (do.), Picea Lowiana, P. Nordmanniana, P. pectinata, Selaginella denticulata, Strawberries (abundant), Thujopsis borealis, T. dolabrata.

1. NORTHAMPTONSHIRE—DAVENTRY, Fawsley.—Lady Knightley.

Gen. Char. of Soil—Loam with a gravelly subsoil.

Alt. and Exposure—500 ft., chiefly S.

Rainfall, 1879—[Weedon Beck, dist., 3 ms.; alt., 265 ft.; ht., 4 ft.; 27·88 ins., on 157 days].

Date of Onset and Duration of Frost—Nov. 21st to Dec. 28th; Jan. 17th to Feb. 1st, 1880.

Min. Temp. and Date—Dec. 7th, 10°.

Plants injured, 1879-80—4 (1), 2 (2), 2 (3)—*Aralia Sieboldii*,

1. Broccoli, 2000 plants, all, 1. *Cryptomeria elegans*, 3. *Cupressus Lawsoniana*, 3. Laurel, common, 2. *Laurustinus*, 2. Lillies, vars., 1. *Tritoma uvaria*, 1.

Observations—The greater number of Laurels and *Laurustinus* injured are on the bank of a stream in a dell.

2. KETTERING, Barton Seagrave.—J. B. Tibbits, Esq., J.P.

Gen. Char. of Soil—Strong loam; damp soil, 700 yards from a river.

Alt. and Exposure—230 ft.; aspect is W. S. W.; entirely sheltered from N. and E.

Rainfall, 1879—30·7 ins.

Date of Onset and Duration of Frost—Nov. 13th till Dec. 30th.

Min. Temp. and Date—Dec. 5—6, 0°.*

Plants injured, 1879-80—8 (1), 7 (2), 2 (3)—Artichoke, globe, 1. *Aucuba*, 2. Broccoli, 1. *Ceanothus azureus*, 1. *Cedrus Deodara*, 2. *Euonymus*, 1. *Hydrangea*, 2. *Ilex*, 2. Laurel, Bay, 1. Laurel, common and Portugal, 2. Pampas grass, 1. *Picea Pin-sapo*, 2. Roses, H. P. and others, 2; Tea, 1. Yew, 3.

Observations—At a locality, five miles distant and 150 ft. higher, sheltered from N., but exposed to E. S. E. — S., and S. W.; on a dry bank with ironstone subsoil, not a tree, plant or vegetable was killed. *Ceanothus* and *Escallonia* were but slightly injured; Pampas grass survived with slight injury, and Tea Roses were quite uninjured. Nothing was protected. There is no water near.

3. NORTHAMPTON, Allthorpe Park.—Mr. E. Cole.

Gen. Char. of Soil—Rich, but rather wet.

Alt. and Exposure—299 ft.; exposed position.

Rainfall, 1879—26·24 ins.

* Thermometer by Neg. and Zam., recently verified.

Date of Onset and Duration of Frost—Dec. 18th to Feb. 2nd.

Min. Temp. and Date—Dec. 7th, 8°.

Plants injured, 1879-80—6 (1), 8 (2), 2 (3)—*Abies Douglasii*, 3. Broccoli, all early vars., 1; late vars., 2; purple sproutings, 1. *Cryptomeria japonica*, 3. *Hydrangea*, 1. Laurel, Bay, 2. Laurel, common, 2. *Laurustinus*, 1. Pampas grass, 2. Parsley, 1. *Picea Pinsapo*, 2. Roses, Tea, 1; many others, 2. *Thuja aurea*, 2. Vegetables, all kinds, 2.

4. TOWCESTER, Canons Ashby.—Sir H. Dryden.

Alt. and Exposure—About 400 ft.

Rainfall, 1879—[Thorpe Mandeville, dist., 5 ms.; alt., 580 ft.; ht., 1 ft.; 33·52 ins., on 172 days].

Min. Temp. and Date—[Fawsley, dist., 4 ms.; Dec. 7th, 10°].

Plants injured, 1879-80—2 (1), 4 (2), 3 (3)—Apples, on walls, bore no fruit, 3. *Cedrus Libani*, 2. Hyacinths, bulbs in 1879, did not attain usual size; falling off of flower-spikes to 80 p. c. in 1880. Limes, failing for some years, 2. Pampas grass, 2. Poplars, Black, 3; Do., Lombardy, many from unmaturing wood, 1; all others, 2, 3: but the killing did not become evident till the leaves of other trees were well out. Roses, Standards, 20 p. c., 1.

Observation—Many Lombardy Poplars, but not the Black Italian, died in 1880, in consequence, I presume, of the hard winter following an immature ripening of the wood. The same thing happened about 20 years ago. The Ash thrived less than usual and was very late.

5. WANSFORD, Thornhaugh.—Rev. J. Jenkyns.

Gen. Char. of Soil—Oolite, clayey but not heavy.

Alt. and Exposure—Close to a small stream.

Rainfall, 1879—[Easton, dist., 5 ms.; alt., 200 ? ft.; ht., 1 ft.; 25·31 ins., on 189 days].

Date of Onset and Duration of Frost—Dec. 1st on and off till Feb. 1st.

Min. Temp. and Date—Dec. 5th—6th, nearly down to 0°.

Plants injured, 1879-80—8 (1), 13 (2), 2 (3)—*Abies Douglasii*, 1. Apple, 2. *Arbutus*, 2. *Aucuba*, 2. *Cercis siliquastrum*, 2. *Cupressus macrocarpa*, 1. Furze, fl. pl., 1. Holly, 2. Ivy, 2. Laurel, Bay, 2. Laurel, common, 1; Do., Portugal, 2. *Laurus-tinus*, all, 1. *Leycesteria*, 2. *Ligustrum ovalifolium*, 2. Honey-suckle, variegated, 1, 2. Myrtle, 1. *Pinus Austriaca*, 3; *P. insignis*, 1. Roses, 1, 2, 3—Banksean, 1; *Devoniensis*, 1; Macartney,

2; Maréchal Niel, 1. *Viburnum Opulus*, 3.

Plants uninjured—Laurel, common, very few. *Pinus insignis*, one tree.

6. WELLINGBOROUGH, Archfield.—Mr. C. J. K. Woolston.

Gen. Char. of Soil—Blue lias clay, covered in many parts with red sandstone and limestone.

Alt. and Exposure—203·3 ft.

Rainfall, 1879—28·77 ins.

Date of Onset and Duration of Frost—Nov. 13th to Feb. 13th, 1880.

Min. Temps. and Dates—Dec. 2nd, 8°·5; Dec. 7th, 0°.

Plants injured, 1879-80—10 (1), 11 (2), 5 (3)—*Araucaria imbricata*, 3. *Arbutus*, 1. Artichoke, globe, 1. *Asparagus*, 2. *Aucuba japonica*, 3. Beans, scarlet runner, 3. *Ceanothus*, 1. *Cedrus Deodara*, large trees, 1, 2. Celery, 2. Clematis, Albert victor, 1; C. Jackmanni, 2. *Cryptomeria elegans*, 2. Ivy, various, 3. Laurel, Bay, 1; Laurel, common, 2; L. Portugal, 1. Peas, early, 1. Potatoes, 2. Roses, dwarfs, 3; standards, 2. *Sequoia gigantea*, 2. *Thuja aurea*, great many, 1, 2. Tomatoes, 2. *Yucca*, 1.

1. OXFORDSHIRE—HENLEY-ON-THAMES, Mill End.—Mr. R. Owen.

Gen. Char. of Soil—Flinty gravel.

Alt. and Exposure—10 ft. above Thames, in an open valley.

Rainfall, 1879—[Greys, Henley-on-Thames, alt., 370 ft.; ht., 1ft. 8 ins.; 37·29 ins.].

Min. Temp. and Date—[Stonor park, dist., 4 ms.; Dec. 7th, 11°].

Plants injured, 1879-80—1 (1), 7 (2), 5 (3)—Apples, 1. Broccoli, Autumn, 1; Spring, 3; Winter, 2. Flowers, bedding, injured by wet, 2; herbaceous, by frost and wet, 3. Fruit, small, 2; wall, 2. Lettuce, 2. Pears, 3. Peas, 3. Potatoes, poor, small and bad flavoured, 2. Spinach, winter, 3.

2. OXFORD, Headington Hill Hall.—Mr. C. Stocking.

Gen. Char. of Soil—Light and sandy, with a shaley gravel subsoil.

Alt. and Exposure—Very high and much exposed to N. and N. E.

Rainfall, 1879—[Oxford Obs., dist., 2 ms.; alt., 208 ft.; ht., 11 ins.; 30·18 ins., on 183 days].

Date of Onset and Duration of Frost—Nov. 21st, heavy snow storm; Nov. 22nd, 15°; Dec. 1st, 10°; Dec. 2nd, 14°; Dec. 5th, 14°; Dec. 17th, 18°.

Min. Temp. and Date—Dec. 1st, 10°. [Oxford, dist., 1½ ms.; Dec. 7th, 9°].

Plants injured, 1879—6 (1), 11 (2), 7 (3)—*Abies Morinda*, 2. *Arbutus Unedo*, 1. *Aucuba japonica*, 3. Broccoli, 1, 2. *Cedrus Deodara*, 2. *Cotoneaster Simonsi*, 3. *Garrya elliptica*, 3. *Juniperus excelsa*, 1. Laurel, Bay, 1. Laurel, common, 2; L. Portugal, 3. *Laurustinus*, 2. Peaches, 2. *Picea Nordmanniana*, 1; *P. Pin-sapo*, 2; *P. Pindrow*, 2. *Pinus excelsa*, 3; *P. Gerardiana*, 2; *P. ponderosa*, 1. *Quercus Ilex*, 2. *Sequoia sempervirens*, 3. *Spartium junceum*, 2.

Plants uninjured — *Abies canadensis*, *A. excelsa* *Clanbrasiliana*, *A. orientalis*, *Araucaria imbricata*, *Berberis Darwinii*, *Biotas*, vars. of, *Cepholotaxus Fortunei*, *Cryptomeria japonica*, *Cupressus Lawsoniana*, *Hippophæe rhamnoides*, Holly, *Juniperus chinensis*, *J. Sabina*, *J. Virginiana*, *Larix pendula*, *Libocedrus decurrens*, *Magnolia Hammondii*, *Picea lasiocarpa*, *P. nobilis*, *Pinus Austriaca*, *P. Cembra*, *P. Lambertiana*, *P. Laricio*, *P. Pinaster*, *P. Sabiniana*, *Quercus Cerris*, *Q. C. Lucombiana*, *Sequoia gigantea*, *Thuja Lobbii*, *T. Sibirica*, *Thujopsis borealis*.

Observations on Conifers—*Abies Morinda*, much injured by late spring frost; *A. orientalis*, a magnificent tree, was perfectly hardy in the most exposed situations. *Biotas*, all varieties do well. *Cedrus Deodara*, trees 40 ft., injured in 1878-9 and 1879-80, fully exposed to N. and N. E., far too tender for elevated positions. *C. Libani*, fully exposed to N. E., was but slightly injured. *Cupressus Lawsoniana* and *Libocedrus decurrens* are perfectly hardy. *Picea Pindrow* makes good growth but is always injured by late spring frosts and is not sufficiently hardy for exposed situations, *P. Nordmanniana* grow very fast till they reach 20 ft., when they lose their leaders. *Pinus Austriaca*, *P. Ambra*, *P. Laricio* and *P. Lambertiana* do exceedingly well, *P. excelsa*, *P. Gerardiana*, *P. Sabiana* and *P. insignis* are not sufficiently hardy to be worthy of planting extensively. *Sequoia sempervirens* is most invariably injured by spring frosts. *Thujopsis borealis* does exceedingly well and is worthy of extensive planting. *S. gigantea*, trees 50 ft., defy frost and wind, showing how it delights in a well drained soil and an elevated position.

DIVISION IV.—EASTERN COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM ESSEX,
NORFOLK AND SUFFOLK.

ESSEX. *Rainfall*, 7 ins. above av. (Dunmow). 4·5 ins. above av. of 14 yrs. (High Roding). Greater floods occurred during the summer than usually occur during the winter (Cold Norton). *Min. rainfall*, Shoeburyness, alt., 18 ft.; ht., 4 ft. 7 ins.; 23·02 ins.: *Max.*, Epping, alt., 345 ft.; ht., 8 ins.; 37·70 ins., on 146 days. A most disastrous year to hay, corn, roots and fruit (Dunmow, &c.). *Min. temps.*, Audley End, alt., 154 ft.; Dec. 7th, -5°·5; Aldborough Hatch, -5° (?); Chignal St. James, -4°; Harlow and Dunmow, 0°.

Plants injured, 1879-80—27 (1), 55 (2), 12 (3), total at 10 places.

NORFOLK. *Rainfall*, 5·75 ins. above av. of 14 yrs. (Geldeston). First 9 months cold, rainy (Norwich &c.). *Min. rainfall*, Holkham, alt., 43 ft.; ht., 4 ft.; 23·14 ins., or 2·27 below av. of 30 yrs.: *max.*, Honingham Hall, alt., 110 ft.; ht., 6 ins.; 29·52 ins., on 203 days, or 3·76 ins. above av. of 30 yrs. Harvest late, long and bad; much hay spoilt; cereals ripened imperfectly (Diss). *Min. temps.*, Garboldisham, alt., 33 ft.; Dec. 7th, -1°; Cossey, 3°·5; Hillington, 5°·2.

Plants injured, 1879-80—39 (1), 52 (2), 22 (3), total at 4 places.

SUFFOLK. The coldest year since 1861 and the wettest since 1872 (Grundisburgh). Spring and summer very cold and sunless with much rain; winter set in early with low temp. during Dec. till the 27th (Culford). *Min. rainfall*, Alton Hall, 26·62 ins., on 102 days. *Max.*, Ixworth, ht., 1 ft.; 32·47 ins., on 186 days. *Min. temps.*, Thornham Hall, Dec. 7th, 2°; Barton Hall, Dec. 2nd, 10°.

Plants injured, 1879-80—12 (1), 20 (2), 7 (3), total at 3 places.

* Thermometer verified, *Frost of Dec.*, 1879, by W. Marriott, p. [5].

REPORTS.

1. ESSEX—CHELMSFORD, Hatfield Peverel.—Mr. H. W. Pitcher.

Gen. Char. of Soil—A heavy wet loam.

Alt. and Exposure—Low, sheltered by wood and park.

Rainfall, 1879—[Chelmsford, dist., 6 ms.; alt., 86 ft.; ht., 1 ft.; 30·80 ins., on 160 days].

Min. Temp. and Date—Dec. 7th, 7 a.m., -1°; Dec. 10th, 1°.

Plants injured, 1879-80—5 (1), 11 (2), 1 (3)—Aucuba, 2. Broccoli, 1. Cabbage, “winter greens,” 1. Cedrus Deodara, 30 ft., 2. Furze, 1. Laurel, Bay, killed to grd., 2. Laurel, common, 2; L. Portugal, 2. Laurustinus, many killed to grd., 2. Liriodendron, 1. Nectarines, 2. Peaches, 2. Pomegranates, to ground, 2. Quercus Ilex, 30 ft. by 30 ft., 2. Roses, 30 out of 36 budded in 1879, 1. Rosemary, 2. Yucca stenophylla, 3.

Observations—*Fruit*, Young trees of Nectarine and Peach planted in the autumn, 1879, much injured; but old trees bore well in 1880. Apples and Apricots gave an average crop; Cherries and Plums, a good crop. Bush fruit, Raspberries and Strawberries, were plentiful (Dec. 1880).

2. CHELMSFORD, Chignal Smeely Rectory.—Rev. W. Gibbens, B.D.

Gen. Char. of Soil—A rich wet clay soil.

Alt. and Exposure—Rather high and exposed.

Rainfall, 1879—[Chelmsford, dist., 4 ms.; alt., 86 ft.; ht., 1 ft.; 30·80 ins., on 160 days].

Min Temp. and Date—[Chignal St. James, dist., 1 m.; Dec. 7th, about -4°].

Plants injured, 1879-80—2 (1), 5 (2)—Arbutus, killed to grd., but recovering, 2. “Cedar,” sweet scented American [Juniperus sp. ?] 21 ft. high, 1. Figs, 2. Laurel, common, where sheltered suffered most, 2. Laurustinus, 2. Pears, the bark of two half grown trees was split open and curled back, 2. Pinus pinea, 20 yrs., 1.

Plants uninjured—Portugal Laurels.

3. CHELMSFORD, Chignal St. James.—Mr. R. M. Christy.

Gen. Char. of Soil—A stiff clay, gravelly near a stream.

Alt. and Exposure—Very low, in a damp situation close to the stream. [Chelmsford, alt., 86 ft.]

Rainfall, 1879—28·42 ins. : max., June, 4·32 ins. ; min., Nov., 59 in. [Chelmsford., dist., 3 ms. ; alt., 86 ft. ; ht., 1 ft. ; 30·80 ins., on 160 days].

Date of Onset and Duration of Frost—About Nov. 20th, with much snow, very sharp frost in first few days of Dec. to 7th. Thaw on evening of Dec. 7th. Frost recommenced on 16th ; thaw on 28th.

Min. Temp. and Date—Dec. 7th, about -4°.

Plants injured, 1879-80—4 (1), 8 (2), 6 (3)—Aucubas, 2. Blackberries, 2 (?). Cabbages, a field of "thousand head," all, 1. Cedrus Deodara, 1, 2. Ivy, lost leaves in spring, 3. Laurel, Bay, 2. Laurel, common, 2 ; Do., Portugal, 2. Laurustinus, 1, 2. Mulberry, aged, severely injured 1860, has lost smaller branches, 3. Privet, leaves only, black, 3. Quercus Ilex, 1, 2. Sequoia gigantea, browned, 3. Vinca major, 3. Yew, lost leaves, 3.

Observations—Deodars, all suffered more or less, and many were entirely killed. Bay Laurels, excepting one large tree on high ground—and this was much injured—all were cut down, but are now shooting again. Common Laurels, those on high ground were only slightly injured, while others on low ground were much cut ; but are now sending up shoots from the base (Oct. 28th, 1880). Portugal Laurels, much cut but not so severely as the preceding. Laurustinus, suffered most of any shrubs, many being quite killed. Quercus Ilex, many were much injured and some large trees quite killed. Wheat, early was no better than late sown.

4. ILFORD, Aldborough Hatch.—Mr. W. Earley.

Gen. Char. of Soil—Stiff clay-like loam.

Alt. and Exposure—Table land between the Thames and Epping Forest.

Rainfall, 1879—[Chigwell Row, dist., 3 ms. ; alt., 188 ft. ; ht., 1 ft. 8 ins. ; 30·25 ins., on 175 days].

Min. Temp. and Date—Believed to be -5°, [too low ? Chigwell Row, dist., 3 ms. ; Dec. 7th, 13°·1].

Plants injured, 1879-80—0 (1), 5 (2), 3 (3)—Apples, Dumelow's seedling, 2. Berberis Darwinii, 3. Euonymus, aureus latifolius, cut to grd., 2. Garrya elliptica, 3. Laurel, Bay, cut to grd., 2. Peaches, on E. and S. walls, 2. Rose, double Macartney, on a warm E. gable, 3. Saxifraga sarmentosa, survived previous winter, 2.

Plants uninjured—Potatoes in ground, undug.

Observations—Apple, Dumelow's seedling, many shoots, as well as all flower-buds, were quite destroyed. Euonymus, the stem and roots below the soil are alive. Peaches, quite half the old wood is killed. Wallflowers, the injury is a most exceptional experience; so much so that the usual cut bunches are priced at not less than 1s. in the market.

5. LEYTONSTONE, Snaresbrook.—Mr. R. Peake.

Gen. Char. of Soil—Gravel over sand, on border of London clay.

Altitude and Exposure—On the borders of Epping Forest, comparatively low; but singularly favourable to the growth of all kinds of trees and shrubs, especially Rhododendrons. Climate, humid.

Rainfall, 1879—[Leyton Obs., dist., 2 ms.; alt., 97 ft.; ht., 1 ft. 3 ins.; 30·55 ins.].

Min. Temp. and Date—[Chigwell Row, dist., 5 ms.; Dec. 7th, 13°·1].

Plants injured, 1879-80—0 (1), 6 (2)—Cedrus Deodara, 2. Clematis Jackmanni, vars., 2. Honeysuckle, evergreen and vars., killed to grd., 2. Laurel, Bay, killed to grd., 2. Laurel, common, 2. Laurustinus, killed to grd., 2.

Plants uninjured—Rhododendrons and Roses quite unhurt.

Observations—Within less than two miles at an increased elevation of some 40 to 50 ft., the above mentioned shrubs were not injured at all, though in a far more exposed situation. Dense fogs occurring at the same time with intense frost were the chief cause of injuries.

6. LITTLE ILFORD, Manor Park.—Mr. W. J. Freestone.

Gen. Char. of Soil—Very light, gravel at a depth of 1 foot.

Rainfall, 1879—[Barking, dist., 1 m.; ht., 1 ft.; 30·59 ins., on 165 days].

Min. Temp. and Date—[Chigwell Row, dist., 6 ms.; Dec. 7th, 13°·1].

Plants injured, 1879-80—6 (1)—Cabbages, "Daniel's defiance," in seed bed, about 90 p. c., 1; a few left were finer than those transplanted. Celery, nearly all, 1. Chrysanthemums, nearly all, 1. Lilium lancifolium, rubrum, in pots out of doors, more destroyed than has occurred for 20 yrs., 1. Parsnips, 1. Pyrethrum aureum, in open, nearly all, 1.

Plants uninjured—Cabbages (pickling), Centaurea gymnocarpa, Onions (Rocca and Tripoli, sown in Aug. 1879; though all were destroyed in 1878-9, none were injured in 1879-80), Pansies, Rhu-

barb) (stood well and was earlier than usual, 1880), Salsafy (self-sown in autumn).

7. STANSTEAD, Elsenham Hall.—Mr. W. Plester.

Gen. Char. of Soil—Kitchen garden, a light sandy soil; flower garden, do. on subsoil of sand; shrubbery, a loam with chalk.

Alt. and Exposure—[Stanstead, alt., 240 ft.]—Flower garden is on rising ground, from W. The shrubbery has a N. aspect.

Rainfall, 1879—[Stanstead, dist., 2 ms.; alt., 240 ft.; ht., 1 ft., 26·45 ins.].

Min. Temps. and Date—[Audley End, 8 ms., N.; Dec. 7th, -5°·5: Harlow, 10 ms., S., 0°].

Plants injured, 1879-80—0 (1), 4 (2)—Berberis Darwinii, 2. Laurel, Bay, killed to grd., recovering, 2. Laurustinus, 2. Roses, dwfs. and standards, 2.

Plants uninjured—Abies Douglasii (20 ft.), A. Nordmanniana (18 ft.), Holly (green and variegated), Juniperus recurva (10 ft.), Pampas grass, Picea Pinsapo, Quercus Ilex (large trees, but bore no acorns), Trees (deciduous). The above mentioned trees are all very healthy.

8. SUDBURY, Bulmer.—Sir G. Burke.

Gen. Char. of Soil—A sandy loam.

Alt. and Exposure—On a hill.

Rainfall, 1879—[Nayland, dist., 8 ms.; alt., 135 ft.; ht., 8 ins.; 29·68 ins., on 111 days].

Min. Temp. and Date—[Barton Hall, dist., 16 ms., N.; Dec. 2nd, 10°: Hatfield Peverel, dist., 20 ms., S.; Dec. 7th, -1°].

Plants injured, 1879-80—Apples and Pears, 1; espaliers, 2. Laurel, common, 3; those on lower ground in the neighbourhood were more severely injured.

9. WEST HAM, Forest Gate.—Mr. T. Dyer.

Gen. Char. of Soil—Gravel and sand below.

Rainfall, 1879—[Leighton Obs., dist., 1½ ms.; alt., 97 ft.; ht., 1 ft. 3 ins.; 30·55 ins.].

Min. Temp. and Date—[Chigwell Row, dist., 7 ms.; Dec. 7th, 13°·1].

Plants injured, 1879-80—3 (1), 3 (2)—Aucuba, 2. Euonymus, young, 1; older, 2. Laurel, Bay, 1. Laurel, common, 2; Do., Portugal, 1.

10. WEST HAM, Ivy House.—Mr. W. Shipman.

Gen. Char. of Soil—Surface consists of alluvium on blue gravel with red below, to Grays, where chalk comes near the surface.

Rainfall, 1879—[See preceding report].

Min. Temp. and Date—[See preceding report].

Plants injured, 1879-80—7 (1), 11 (2), 1 (3)—Box, edging, 2. Euonymus, 2; Do. gold and silver vars., 2; but all small plants, 1. Holly, cut back, 3; Do. variegated, killed to grd., 2. Ivy, 40 ft. by 40 ft., 2; Do. variegated vars. suffered more severely than the green, 1, 2. Laurustinus, 1, 2. Mulberry, fruiting wood killed, 2. Pampas grass, 1. Rhododendrons, many, 1, 2. Tritoma uvaria, 1, 2. Wallflowers, 1. Walnut, 2.

Plants uninjured—Trees and shrubs not included in the above resisted the frost well. Seeds of a number of garden flowers left in the soil flowered well in 1880.

Observations—Mulberry, this appears to have suffered alike in all South Essex, on high-lying lands as well as low, but [in all cases more wood was destroyed on the N. side of the trees than the South. Pampas grass, clumps that have been uninjured for years are quite gone; but on higher land (Woodford, Loughton, &c.) only the N. side of the clumps were killed. While in still higher districts (Brentwood, Warley, &c.) the Pampas grass remained unhurt. New-planted trees and shrubs, about 90 p. c. were killed.

1. NORFOLK—EAST HARLING, Garboldisham Manor.—Mr. T. Barson.

Gen. Char. of Soil—Heavy and wet; subsoil, a stiff clayey loam.

Alt. and Exposure—33 ft.; the ground slopes to W., N. and E. Winds very severe, causing much damage in spring.

Rainfall, 1879—[Diss, dist., 7 ms.; alt., 96 ft.; ht., 1 ft.; 30.95 ins., on 202 days].

Min. Temp. and Date—Dec. 7th, -1°.

Plants injured, 1879-80—11 (1), 17 (2), 6 (3)—Apples, standards, 4 yrs., many, 2. Aucuba japonica, 2. Berberis Darwinii, 2. Biota orientalis, 3. Broccoli, nearly all, 1. Brussels sprouts, 2. Cabbages, savoy, 1. Cedrus Deodara, 2. Cistus ladaniferus, 2. Cotoneaster rotundifolia, 2. Euonymus ovatus, aureus, 1. Furze, fl. pl., 1. Garrya elliptica, 1. Holly, variegated, 3. Laurel, Bay, 1. Laurel, common, 3; L. Portugal, 2. Laurustinus, 1. Pampas grass, 2. Peaches, 2. Phillyrea, 2. Picea Pinsapo, 3. Poplar,

Lombardy, 7 and 8 yrs., many, 1, 2. *Retinospora ericoides*, 2. Roses, dwfs., many killed to grd., 2; stands, 1, 2. Rosemary, 1. *Ruscus aculeatus*, 1. *Thuja aurea*, 2. *Thujopsis borealis*, 3. Yew, 3.

2. LONG STRATTON, Boyland Hall.—Mr. M. Riches.

Gen. Char. of Soil—Heavy cold soil.

Alt. and Exposure—Low, surrounded by plantations.

Rainfall, 1879—33·28 ins.

Date of Onset and Duration of Frost—Nov. 11th to Dec. 27th was the most severe. At intervals from Jan. 12th to Feb. 1st.

Min. Temp. and Date—Dec. 1st [2nd?], 5°.

Plants injured, 1879-80—Laurel, common, killed nearly to grd., 2. Stocks, Brompton, 1.

3. LYNN REGIS, Hillington Hall.—Mr. J. Platt.

Gen. Char. of Soil—Sand overlying chalk.

Alt. and Exposure—74 ft.; N. E. coast.

Rainfall, 1879—Ht., 1 ft.; 32·10 ins.

Date of Onset and Duration of Frost—From middle of Nov. to beginning of Feb., 1880.

Min. Temps. and Dates—[Hillington Rectory, dist. 7 ms.; alt., 88 ft.; Dec. 7th, 5°·2; Jan. 27th, 17°·9].

Plants injured, 1879-80 — 13 (1), 15 (2), 10 (3)—Apples, 1, 2, 3. Apricots, 2, 3. Artichoke, globe, 2. Broccoli, 1. Brussels sprouts, 3. Cabbage, 1, 2; savoys, rotted after thaw, 1, 2. Dahlias, tubers immature, many, 1. Endive, rotted after thaw, 1. Figs, killed to grd., 2. *Herbs*, sweet, esp. Sage, Savory and Thyme, 1, 2, 3. *Herbaceous* plants, much from wet, 1. Hollyhocks, 1. Lettuce, about half, 1. Nectarines, 2, 3. Nuts, 2. Peaches, 2, 3. Pears, 1, 2, 3. Planes, 2. Plums, 3. Roses, 1, 2, 3. Spinach, 1. Strawberries, potted, 2. Vines, 2. Walnuts, 3.

Plants uninjured—Hollies; Bush fruit plentiful, but deficient in flavour; Strawberries, a medium crop, 1880.

Observations—Apples and Pears do not appear to have made any progress towards recovery, fruit scarcely any. Young Apple trees suffered equally with old ones, but showed nearly as much injury in Oct., 1879, as after the frost. Apricots, Nectarines and Peaches still show great weakness outside; indoors, a great falling off of fruit in stoning, showing a deficiency of root action; fruit deficient in flavour. Artichoke, globe, has made healthy growth but very few heads. Planes did not bear foliage till after Midsummer. Roses,

standards and dwarfs, have not yet recovered. Gloire de Dijon, injured less than others; Maréchal Niel has made very eccentric growth. Vines, early houses very inferior; showing great weakness from loss of root action: later houses have ripened well; Muscats very weak. All Vinès show debility from absence of *solar heat* to ripen wood. Walnuts have no fruit, but did not receive so much injury to wood as is usual after severe frosts (Oct. 20th, 1880).

4. NORWICH, Carrow House.—Mr. H. Jones.

Gen. Char. of Soil—Calcareous and sandy.

Alt. and Exposure—20 ft. to 50 ft.; Easterly and N.

Rainfall, 1879—31·59 ins.

Date of Onset and Duration of Frost—Dec. 7th to Feb. 5th, 1880, with only 12 days intermission.

Min. Temps. and Dates—Dec. 25th [2nd or 7th?], 6°; [Jan. 28th, 19°; Costessy, dist., 4 ms.; Dec. 2nd, 4°; 7th, 3°·5].

Plants injured, 1879-80—14 (1), 19 (2), 6 (3)—*Abies orientalis*, 2; *A. Smithiana*, 2. *Arundo Donax*, 1. *Aucuba*, 3. *Buddlea globosa*, 1. *Cedrus Deodara*, 2; *C. Libani*, 2. *Cotoneaster*, 3. *Cryptomeria elegans*, 1. *Cupressus erecta, viridis*, 2; *C. Lawsoniana, gracilis*, 1; *C. macrocarpa*, 2. *Cytisus Laburnum, new golden*, 3. *Elæagnus argentea*, 1. *Euonymus japonicus*, 2; *variegatus*, 1; *E. radicans, var.*, 2. *Fraxinus Xanthoxyloides*, 2. *Holly, variegated*, 3. *Ivy, common and Irish*, 2. *Laurel, common*, 3; *L. Portugal*, 3. *Leptospermum lanigerum*, 1. *Ligustrum coriaceum*, 1; *L. japonicum*, 2; *L. jap. ovalifolium*, 2. *Liquidambar*, 1. *Osmanthus ilicifolius variegatus*, 3. *Pampas grass*, 2. *Pears, in some nearly all spurs dead, except at top of trees*, 2. *Phillyrea*, 2. *Picea Pinsapo*, 2. *Quercus Ilex*, 2. *Rhamnus hybrida*, 2. *Rhus laciniata*, 1. *Robinia umbraculifera*, 2. *Roses, dwarfs*, 5 p. c.; *standards*, 15 p. c.; *Tea, including Gloire de Dijon, all*, 1. *Syringa alba, grandiflora (new)*, 1. *Taxodium sempervirens*, 2. *Veronicas*, 1.

Plants uninjured—*Cephalotaxus Fortunei*, *Chinese Juniper*, *Osmanthus ilicifolius*, *Retinospora pisifera*, *R. obtusa*, *R. obtusa aurea*, *R. plumosa*, *Salisburia adiantifolia*, *Thujopsis dolabrata*, *T. læteviridis*, *T. Standishii*.

1. SUFFOLK — BURY ST. EDMUND'S, Barton Hall. — Sir C. J. F. Bunbury, Bart.

Gen. Char. of Soil—Gravel and clay much mixed, with a large proportion of chalk rubble.

Alt. and Exposure—Considerably higher than Bury St. Edmund's. The arboretum is much sheltered by groves.

Rainfall, 1878—Ht., 1 ft., 30·76 ins., on 223 days.

Min. Temp. and Date—Dec. 2nd, 10°.

Plants injured, 1879-80—1 (1), 4 (2), 2 (3)—*Cupressus Goveiana*, 2; *C. sempervirens*, erect var., 2; *C. s.* spreading var., injured most, 2. *Euonymus japonicus* (?), 1. Laurel, Bay, leaves only crisped, kd. to grd., 1860-61, 3. *Laurustinus*, do., 3. *Magnolia grandiflora*, 50 yrs., kd. to grd., 1860-1, on wall facing S. and E., recovering, 2.

Plants uninjured—*Æsculus* (Pavia) *indica* (few fls., 1880), *Æ. macrostachya*, *Arbutus Unedo* (kd. to grd., 1860-1), *Cedrus Deodara*, *C. Libani*, *Euonymus japonicus* (?) sheltered, *Halesia tetraptera*, *Paulownia imperialis*, *Picea pectinata* var. *Cephalonica*, *P. Pinsapo*, *Quercus Ilex* (lost all leaves in 1860-61).

2. BURY ST. EDMUND'S, "West Suffolk" [locality ?].—Mr. H. Pugh.
Gen. Char. of Soil—Mixed, rather heavy.

Alt. and Exposure—In a valley; not much exposed.

Rainfall, 1879—[Bury St. Eds.; mean of 4 estimates, 30·8 ins.].

Min. Temp. and Date—[Barton Hall, Dec. 2nd, 10°].

Plants injured, 1879-80—8 (1), 9 (2), 5 (3)—*Aucuba japonica*, 1, 2. *Cedrus Deodara*, 1, 2, 3. Laurel, common, 1, 2, 3; *L. Portugal*, 2, 3. *Laurustinus*, 1, 2, 3. Pampas grass, 2. *Picea Pinsapo*, 1, 2. *Quercus Ilex*, 1. Roses, 1, 2, 3. Yew, 1, 2.

3. EYE, Thornham Hall.—Mr. J. Perkins.

Gen. Char. of Soil—A strong loamy soil, resting on brick-earth.

Alt. and Exposure—100 ft.; exposed to E. and W. winds.

Rainfall, 1879—[Diss, dist., 6 ms.; alt., 96 ft.; ht., 1 ft.; 30·95 ins., on 202 days].

Date of Onset and Duration of Frost—Nov. 12th to end of Jan., 1880. Slight frosts continued more or less till end of May.

Min. Temp. and Date—Dec. 7th, 2°.

Plants injured, 1879-80—3 (1), 7 (2)—Apricots, 2. Broccoli, 1. *Eucalyptus globulus*, 1. Figs, 2. Laurel, Bay, 2. Lettuce, 1. *Leycesteria formosa*, 2. *Lonicera reticulata*, 2. *Magnolia grandiflora*, 2. Roses, 2.

Observations—Fruits in 1880—Apples, a total failure; Cherries, Currants, Gooseberries, abundant; Nectarines and Peaches, a failure; Pears, nearly a total failure; Plums, a fair crop; Strawberries, abundant; Walnuts, plentiful.

DIVISION V.—S. W. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879, FROM CORNWALL, DEVONSHIRE, DORSETSHIRE, SOMERSETSHIRE AND WILTSHIRE.

CORNWALL. *Rainfall*, excessive, with low temp. during the summer (Empacombe &c.). At end of Sept., was 13 ins. above av. of 29 yrs.; but from scarcity of rain in Oct., Nov. and Dec., the total fall was above av. by only 2·53 ins. (Bodmin). *Min. rainfall*, Newquay, alt., 90 ft.; ht., 1 ft. 9 ins.; 34·97 ins., on 171 days, being 12·77 ins. above the mean of 30 yrs.: max., Launceston, alt., 570 ft.; ht., 1 ft.; 59·81 ins., on 213 days. Absence of sunshine had a very injurious effect on plants (St. Agnes). Crops of every description bad (Trevarna, Empacombe, &c.). *Min. temps.*, Alton, alt., 570 ft.; Dec. 2nd, 10°: Truro, Dec. 2nd, 17°: Bodmin, Dec. 5th, 20°.

Plants injured, 1879-80—14 (1), 16 (2), 28 (3), total at 2 places.

DEVON. *Rainfall*, about 10·5 p. c. above av. of 15 yrs. (Plymouth). Nine months (except March) wet; but last 3 months very dry; total rainfall, 38·56 ins. (Babbacombe). *Min. rainfall*, Ilfracombe, alt., 34 ft.; ht., 9 ft.; 31·38 ins., on 209 days: max., Plympton, alt., 360 ft.; ht., 1 ft.; 69·81 ins. The effect of the wet and cold season was disastrous to crops, *e.g.* wheat, hay, green crops and potatoes (East Budleigh, Clawton, &c.). *Min. temps.*—Exeter, Dec. 11th, 15°: Exbourne, Dec. 4th, 17°: Dartmoor, alt., 1350 ft.; Dec. 2nd, 18°: Plymouth, alt., 73 ft.; Dec. 5th, 20°·8.

Plants injured, 1879-80—17 (1), 27 (2), 16 (3), total at 4 places.

DORSET. A wretched summer; temp. persistently low, with marked absence of sun (Wimborne). *Min. Rainfall*, Chalbury, alt., 338 ft.; ht., 2 ft.; 31·75 ins., on 183 days. Max., Minterne, alt., 566 ft.; ht., 2 ft.; 46·79 ins., on 156 days. Potato crop., half an av., and much diseased; Wall-fruit, a failure * (Wimborne). *Min. temps.*, Beaminster, Dec. 4th, 15°: Layton Herring and Weymouth, alt., 200 ft.; Dec. 5th, 18°: Canford, Jan. 21st, 12° [too low?].

Plants injured, 1879-80—25 (1), 36 (2), 40 (3), total at 7 places.

SOMERSET. June, July and Aug., cold, cloudy and stormy; Oct. and Nov. very fine, dry and cold; Bar. high (Bincombe House, Taunton, &c.). *Rainfall* below av. (Taunton, Exford); 5·30 ins.

* For injuries to Vegetables, see *Gard. Chron.*, 1880, p. 564.

above av. of 19 yrs. (Bath). Min. rainfall, Taunton, alt., 120 ft. (?) ; ht., 1 ft. 4 ins. ; 27·77 ins., on 155 days. Max., Exford, alt., 905 ft. ; ht., 1 ft. ; 55·02 ins., on 244 days. *Min. temps.*, Mells, Dec. 6th [2nd ?], 10°·5 : Bath and Downside, alt., 592 ft. ; Dec. 2nd, 12°·6 : Bridgewater, 19° : Kilmington, 20°.

Plants injured, 1879-80—18 (1), 32 (2), 31 (3), total at 4 places.

WILTSHIRE. *Rainfall*, at 9 stations, above av. of 10 yrs. ; at 17 above that of 1879 ; but at 4 below it. 8 months very wet ; March, Oct., Nov. and Dec., very dry (Steeple Ashton, Holt, &c.). Min. rainfall, Steeple Ashton, alt., 240 ft. ; ht., 1 ft. ; 31·04 ins., on 207 days : max., Corsham, alt., 350 (?) ft. ; ht., 1 ft. ; 41·70 ins., on 210 days. *Min. temps.*—Salisbury, alt., 186 ft. ; Dec. 7th, 10° : Holt, alt., 120 ft. ; Dec. 2nd, 12°·2 : Calne, Dec. 7th, 13°.

Plants injured, 1879-80—4 (1), 4 (2), total at 1 place.

REPORTS.

1. CORNWALL—CAMBORNE, Tehidy Park.—Mr. James Davies.

Gen. Char. of Soil—Surface, a rich loam, but with very shallow subsoil, a poor shaly stone mixed with mineral, and abounding in spar.

Alt. and Exposure—160 ft., 203 ft., and 277 ft., at different levels.

Rainfall, 1879—45 ins.

Min. Temp. and Date—[Dec. 2nd ?] 21° [Truro, dist., 10 ms. ; Dec. 2nd, 17°].

Plants injured, 1879-80—10 (1), 8 (2), 16 (3)—*Acer palmatum*, 3 ; *A. polymorphum*, *atropurpureum*, by cutting winds, 3. *Akebia quinata*, 1. Apples, 2. *Aralia Sieboldii*, 1. *Arbutus Andrachne*, 3. *Berberidopsis corallina*, 1. *Cupressus Lawsoniana*, *aurea*, *variegata*, 3. *Dracæna erythrorachis*, 2. *Eleagnus argentea*, 3 ; *E. pungens*, *variegata*, 3. *Embothrium coccineum*, 2. *Escallonia montevidensis*, 2. *Eucalyptus globulus*, 1. *Eugenia Ugni*, 3 ; *E. U. variegata*, 1. *Eurya latifolia*, *variegata*, 3. *Grevillia rosmarinifolia*, 1. *Gunnera scabra*, 1. *Hydrangea Otaksa*, 3. *Ligustrum japonicum*, 3. *Liquidambar styraciflua*, 3. *Melanthus major*, 1. *Myrtus apiculata*, 2. *Nandina domestica*, 2. *Ozothamnus thyrsoideis*, 1. Peaches, 3. *Phormium tenax*, *Colensoi*, 3 ; *P. t. variegatum*, 3. *Photinia serrulata*, 3. *Pittosporum Tobira*, 2 ; *P. T. variegatum*, 1. *Retinospora pisifera*, *aurea*, 3. *Rhus glabra*, *laciniata*, 1. *Sequoia sempervirens*, *variegata*, slowly recovering, 2. *Thea Bohea*, 2.

Observations—*Fruit trees*, Apples made very poor and immature wood, and bore a very poor crop in 1880. Pears did very well and bore a good crop of fine flavour. Peaches cast their leaves before the fruit was gathered; but the autumn of 1879 being fine they shot out leaves at all their extremities which restored circulation and the wood ripened fairly. This saved the trees which gave a moderate crop of fruit in 1880.

2. PENZANCE.—Mr. W. Roberts.

Gen. Char. of Soil—"Killas"* with subsoil of killas and granite.

Alt. and Exposure—Half a mile from the sea, exposed to most winds; partly shaded by trees.

Rainfall, 1879—[Alt., 94 ft.; ht., 3 ft.; 50·7 ins., on 257 days].

Date of Onset and Duration of Frost—Duration was never more than a day or two.

Min. Temps. and Dates—[Helston, dist., 10 ms.; alt., 160 ft.; Dec. 1st., 25°: Falmouth, dist., 19 ms.; alt., 200 ft.; Dec. 5th, 27°·7], Jan. 17th, 31°.

Plants injured, 1879-80 — 0 (1), 5 (2), 8 (3)—*Aralia Sieboldii*, 3. *Aster argophyllus*, 3. *Camellias*, 3. *Chamærops oxyacantha*, 2. *Fabiana imbricata*, flrs. rotted prematurely in bud, 3. *Fatsia papyrifera*, 2. *Hedychium flavum*, 2. *Musa Ensete*, 3. *Peaches*, 2. *Richardia æthiopica*, flrs. rotted before maturing, 3. *Roses*, 3. *Seaforthia elegans*, 2. *Vegetables*, garden, 3.

Plants uninjured, 1879-80—*Aralia heterophylla*, *Colletia horrida*, *Desfontainea spinosa*, *Dracæna australis*, *Embothrium coccineum*, *Eucalyptus globulus*, *Eulalia japonica zebrina*, *Fabiana imbricata*, *Garrya elliptica*, *Iberis gibraltarica*, *Leycesteria formosa*, *Lilium giganteum* (7 ft.), *Maurandya Barclayana*, *Nandina domestica*, *Phoridium tenax*, *Veitchii*.

Plants injured, winter, 1878-9 — (*Min. temp.*, Jan. 11th, 1879, 26°)—*Calceolarias*, 2. *Fourcroya longæva*, 1. *Mesembryanthemum crystallinum*, 3. *Musa Ensete*, 1. *Pelargonium*, zonal vars., 1. *Primula japonica*, 2. *Roses*, 3.

Plants uninjured, 1878-9—*Cassia corymbosa*, *Coprosma*, *Fourcroya longæva* (rather more protected).

Observations—Nothing was killed, winter 1879-80. The injury was seen in the shyness of blossoming of *Camellias* [see Report from Poole, Dorset], *Hawthorns*, *Hedychium* and *Roses*. Peach trees are

* [Killas is the Cornish name for clay-slate.]

in a very bad condition, producing no fruit whatever. The flowers dropped off suddenly and the fruit refused to form. This is owing to the wet summer of 1879, in consequence of which the wood had not ripened. Garden vegetables are all more or less affected; probably owing to the seeds not having ripened properly, especially of Beans, Leeks, Onions and Peas.

1. DEVON—EXBOURNE, Broomford Manor.—Mr. W. Mortimore.

Gen. Char. of Soil—Very poor; in some parts very wet, with a hard strong clay subsoil.

Alt. and Exposure—540 ft.; exposed from E. to S. W.; situated on N. side of Dartmoor hills.

Rainfall, 1879—40 to 47 ins.

Date of Onset and Duration of Frost—Dec. 1st to 6th; 9th to 20th; Jan. 18th, 1880, to Feb. 1st.

Min. Temps. and Dates—Dec. 14th, 17°; Jan. 28th, 22°.

Plants injured, 1879-80—4 (1), 8 (2), 2 (3)—Broccoli, 1, 2, 3. Buddlea globosa, 2. Ceanothus, 3 vars., on walls, 2, 3. Cherries, nearly all, 2. Laurel, Bay, kd. to grd., 1, 2. Peaches, 2. Pinus insignis, 1, 2. Roses, H. P.'s and Teas, 1, 2.

Observations—Broccoli, this was laid down and covered with dry fern in Nov.; the Leamington variety and Cattell's Eclipse were the best and hardiest. Cherries, May Duke and Morello, alone, uninjured; the old wood was spotted and much gum oozed out. Peaches, the wood did not ripen, and some bore leaves until Feb., 1880 [see Meteor Obs. from Bucks., p. 23]; where pruned the pith was found to be very soft and black. Roses, of 109 budded in 1879, 60 were killed or severely injured. The first frost turned the wood black in places on the young stem, as also of the stocks.

2. EXETER, Haldon House.—Mr. Geeson.

Gen. Char. of Soil—A deep rich loam on sandstone.

Alt. and Exposure—500 feet from S. W. to N. W.

Rainfall, 1879—[Bovey Tracey, dist., 5 ms. (?) ; alt., 94 ft.; ht., 6 ins.; 47·47 ins., on 231 days].

Date of Onset and Duration of Frost—Severest period from Dec. 7th to 13th and on Jan. 27th. One and a half ins. of snow fell on Dec. 9th.

Min. Temps. and Dates—Dec. 10th, 17°; 11th, 15°; Jan. 27th, 23°.

Plants injured, 1879-80—1 (1), 1 (2), 7 (3) — Aponogeton dis-

tachyon, in shallow tank, 3. Broccoli, 3. Cyclamen persicum, 3. Escallonia montevidensis, 3. Eucalyptus globulus, killed in May, 1. Hydrangeas, 3. Lachenalia tricolor, 3. Lettuce, large, 2. Vallota purpurea, 3.

Plants uninjured.—Aralia Sieboldii, Do. variegata, Arbutus (various sorts), Azalea amoena, Camellias, Coronilla glauca, Corypha australis, Escallonia macrantha, Common Laurel, Laurustinus, Lettuce (small), Pinus insignis (64ft.), Quercus glabra, Q. Ilex, Q. Luckombe Oak, Q. Suber (8 and 40 ft.), Q. Willow Oak, Roses, H. P.'s and a few Teas.

3. SOUTH MOLTON, Castle Hill.—Mr. D. Wilson.

Gen. Char. of Soil.—A very inert clayey soil of a tenaceous character.

Alt. and Exposure.—300 ft.; very exposed to W. Atlantic winds and gales: 13 ms. from the sea.

Rainfall, 1879—44·80 ins.

Date of Onset and Duration of Frost.—[Frost severe throughout Devon first wk. in Dec.]—Jan. 10th to 29th, 1880.

Min. Temps. and Dates.—[Barnstable, dist., 8 ms.; alt., 43 ft.; Dec. 5th, 21°]; Jan. 28th, 21° [Exbourne, dist., 17 ms.; Jan. 28th, 22°].

Plants injured, 1879-80—10 (1), 16 (2), 2 (3)—Aloysia citriodora, 1. Artichoke, globe, 2. Borecole, 2. Broccoli, 1, 2. Brussels sprouts, 2. Camellias, sorts, 2. Cedrus Deodara, 3. Daphne, 2. Escallonia, sp., 2. Eucalyptus, sp., 1. Euonymus, 2. Hydrangeas, 2. Larch, seedlings and 2 yrs. old, 2. Laurel, Bay, 2. Laurustinus, 2. Lavander, 1. Magnolia, 2. Myrtle, 2. Pampas grass, 2. Picea pectinata, 3. Rosemary, 1. Roses, dwfs. on Manetti stocks, 1, 2; stands. on wild briars, one-third, 1, 2. Sage, 1. Thyme, 1. Tritoma uvaria, one-third, 1.

4. TORQUAY, Babbacombe.—E. E. Glyde, Esq., F.M.S.

Gen. Char. of Soil.—Clay and limestone.

Alt. and Exposure.—294 ft.; facing S., but exposed to S. W. and N. E. winds.

Rainfall, 1879 — Ap. to June, 13·69 ins.; July to Sept., 12·47 ins.; Oct. to Dec., 2·46 ins.; total 41·02 ins., on 212 days.

Date of Onset and Duration of Frost.—Nov. 14th to Jan. 22nd. No frost occurred from Dec. 28th to Jan. 12th. Frost occurred 16 nights in the air and 25 on the grass in Dec., 1879. Snow fell on

Dec. 2nd and 5th, half-inch thick. A heavy Easterly gale blew on the 4th, followed by intense frost. N. or E. winds prevailed till 26th. In January, 1880, cold E. and N. E. winds prevailed from 6th to 28th. Frost occurred on 12 nights in air, and 20 on grass. 4 inches of snow fell on 13th; gone by 17th. Weather generally dull, gloomy and misty. Vegetation was much burnt by the frosts. Lowest temp. of earth at 9 a.m. in winter of 1879-80 was $33^{\circ}\cdot7$ on Jan. 28th at 6 ins. below surface; $35^{\circ}\cdot0$ on Jan. 29th at 12 ins. below surface.

Min. Temps. and Dates—Dec. 13th, $22^{\circ}\cdot8$; Dec. 17th, $13^{\circ}\cdot7$, on grass: Jan. 28th, 1880, $21^{\circ}\cdot9$ in shade.

Plants injured, 1879-80 — 2 (1), 2 (2), 5 (3)—*Erica mediterranea*, cut where exposed to E. winds, 3; but not much injured in 1878-9. *Eucalyptus globulus*, 1 in 1878-9; that winter having been severer than that of 1879-80, owing to the continued Easterly winds in Jan. Laurel, Bay, 3. Laurel, common, 3. *Melianthus major*, cut to grd., 2. *Thuja* sp., 3. *Veronicas*, tender sorts, 1; others, 2, 3.

Plants uninjured—*Garrya elliptica*, *Picea nobilis*, *Taxodium*.

1. DORSET—BEAMINSTER, Parnham House.—Mr. J. Mullins.

Gen. Char. of Soil—A sandy loam on limestone.

Alt. and Exposure—About 300 to 400 ft.

Rainfall, 1879—44·56 ins.

Date of Onset and Duration of Frost—Nov. 30th to Dec. 10th.

Min. Temp. and Date—[Dec. 4th, 15°].

Plants injured, 1879-80—12 (1), 17 (2), 15 (3)—*Aloysia citriodora*, 15 yrs. old, 1. *Aralia Sieboldii*, 3. *Bambusa gracilis*, 2; *B. nigra*, 2. *Broccolis*, Adams, early, 1. Cattell's Eclipse, 1; Chaple's Cream, 1; Early purple, 1; Elletson's Mammoth, 2; Welcome, 2.—*Calycanthus floridus*, fr. buds lost, 3. *Camellias*, fr. buds lost, 3. *Chrysanthemum*, sorts, 2. *Colletia Bictoniensis*, 3. *Cupressus Knightiana*, 3. *Cytisus tomentosus*, 2. Endive, Batavian, 1. *Escallonia macrantha*, 3. *Eschscholtzias*, 1. *Eucalyptus*, 7 yrs. old, twice partially injured, 1. *Euonymus*, gold and silver, 3. *Eurybia ilicifolia*, 2. *Fuchsia gracilis*, large and old in open grd., 2. Hollies, lost foliage, 3. Kale, sea, 1. Laurel, Bay, 3. *Laurustinus*, 3. Lettuce, Hammersmith, 2. *Magnolia conspicua*, fr. buds lost, 3; *M. grandiflora*, all summer growth kd., 2. Marigolds, in pots, 1. *Myrtle*, 2. *Olea sylvestica*, 2. Pampas grass, 3. *Paulownia imperialis*, 1. *Phormium tenax*, 3. Roses, sorts, 1, 2, 3. *Silene compacta*, 1.

Stocks, various, 1, 2. Tritoma uvaria, 2. Veronica Andersoni, variegata, 2; crimson, 1; V. salicifolia, variegata, 2; V. speciosa, 3. Wallflowers, fl. pl., 2. Yucca recurva, 2.

2. DORCHESTER, Frampton Court.—Mr. S. Pullman.

Gen. Char. of Soil—Alluvial, sandy clay resting on gravel.

Alt. and Exposure—Garden situated in a valley, close to river Frome; very much sheltered on every side by trees, with rising ground on S. and N.

Rainfall, 1879—[Bridport, dist., 10 ms.; ht., 1 ft. 3 ins.; 36·60 ins., on 158 days].

Min. Temps. and Dates—Dec. 6th, 8° [too low? Beaminster, dist., 10 ms.; Dec. 4th, 15°: Weymouth, dist., 10 ms.; Dec. 5th, 18°].

Plants injured, 1879-80—9 (1), 6 (2), 5 (3)—Acer rubrum, 2. Amaryllis Belladonna, bulbs ripened badly, 3. Arbutus Unedo, 2. Aponogeton distachyon, 1. Aucuba japonica, 3. Ceanothus azureus, on wall, 3. Hydrangea hortensis, 1; H. japonica, 1. Laurel, Bay, 2. Laurel, common 2. Laurustinus, 2. Magnolia grandiflora, small plants on E. wall, 2, 3. Myrtles, small, planted in summer, 1. Pampas grass, 1, on an island in saturated soil, 3. Passiflora cœrulea, 1. Pinus insignis, weakly plant, 1. Roses, Tea, 1. Veronica salicifolia, 2; V. Andersoni, 1.

Plants uninjured—Berberis japonica (sheltered), Chamæpeuce Diacantha, Cupressus torulosa, *Fruit trees*, all except Apples, Pears and Peaches, which ripened their wood badly and bore bad crops, Pinus insignis (healthy plant), Sequoia sempervirens, Thujaopsis dolabrata (small plant), Tritoma uvaria, Yucca gloriosa.

3. DORCHESTER, Wolferton House.—A. Bankes, Esq.

Gen. Char. of Soil—Gravel.

Alt. and Exposure—Exposed to S. E. wind.

Rainfall, 1879 — [Weymouth, dist., 7 ms.; alt., 225 ft.; ht., 1 ft.; 39·07 ins., on 196 days].

Date of Onset and Duration of Frost—Frost, very long; but the snow lay only for about 12 hours.

Min. Temps. and Dates—[Langton Herring, dist., 6 ms.; alt., 200? ft.; Dec. 5th, 18°].

Plants injured, 1879-80 — Euonymus, gold and silver vars., exposed to S. E. winds, 2 [cf. Rep. Chiswick, p. 2, and Hunts, Rep. 1, pp. 3, 4]. Laurels, common, 3. Laurustinus, 3.

Plants uninjured—Euonymus (elsewhere), Roses.

4. POOLE, Parkstone.—Prof. G. F. Allman.

Gen. Char. of Soil—Very light and sandy, in which no water hurtful to vegetation can accumulate. There is a natural growth of Heath and extensive plantations of Scotch Fir and Pinaster which freely sow their own seed.

Min. Temp. and Date—Jan. 11th, 1879, 15°.

Plants injured, 1878-9—1 (1), 2 (2), 6 (3)—Aloysia citriodora, 3. Arbutus Andrachne, var., photiniæfolia, planted in Aug., 3. Casuarina tenuifolia, in open, 1. Ceanothus azureus, planted in Aug., 3. Cordyline australis, kd. to grd., 2. Desfontainea spinosa, planted in Aug., 3. Eucalyptus globulus, in open, 2. Hypericum oblongifolium, planted in Aug., 3. Veronica Andersoni, vars., and hybs., some, 3.

Plants uninjured—Abies cephalonica, Arbutus Unedo, Arundo Donax, Aucuba japonica (male, female and vars.), Bambusa Metake, Buddlea globosa, Cedrus Deodara, Cistus albidus, C. formosus, C. ladaniferus, C. purpureus, C. salviæfolius, C. villosus (var. crispus), Cryptomeria elegans, Cupressus funebris, C. Lawsoniana, C. macrocarpa, C. sempervirens, Cytisus albus, Daphne Cneorum, D. Fioniana, Erica codonodes, E. mediterranea, E. vagans, Escallonia floribunda, E. macrantha, Eugenia apiculata, Euonymus japonicus, Fuchsia coccinea and vars., Griselinia littoralis, Hibiscus syriacus, Hypericum patulum, Jasminum officinale (S. W. wall), Juniperus sinensis, J. virginica, Bay Laurel, Common Laurel, Portugal Laurel, Laurus tinus, Libocedrus decurrens, Ligustrum japonicum, Magnolia conspicua (var. Lenné), M. grandiflora, Menziesia polifolia, Myrica cerifera, Myrtle, Olearia Haastii, Osmanthus ilicifolius, Passiflora ccerulea, Pernettya mucronata, P. m. speciosa, Pinus insignis, Retinospora plumosa, Robinia hispida, Rosa Banksiæ (on S. W. wall), R. bracteata (do.), Maréchal Niel (and many vars. and hybs., stands and bushes), Sequoia gigantea, Spartium junceum, Solanum jasminoides, Thuja occidentalis (var. aurea), T. Lobbii, Viburnum Awafurki, Yucca filamentosa, Y. gloriosa, Y. recurva.*

5. POOLE, S. Lytchett.—Mr. J. Menzies.†

Gen. Char. of Soil—A “kindly” soil and well drained.

Alt. and Exposure—100 ft.; gently sloping towards S. Owing to influences of sea air, seldom as low temp. as inland.

* Gard. Chron., 1880, p. 331.

† Gard. Chron., 1880, p. 563.

Rainfall, 1879—[Wimborne Minster, dist., 5 ms.; alt., 338 ft.; ht., 2 ft.; 31·75 ins., on 183 days].

Min. Temps. and Dates—[Bournemouth, dist., 8 ms., E.; [Dec. 7th, 19°], Jan. [21 ?]. 18°; [Canford, dist., 5 ms.; Jan. 21st., 12°].

Lowest previous temps. recorded, Jan. 1871, 25°; Jan. 1879, 20°.

Plants injured, 1879-80 — 5 (2), 5 (3)—*Aloysia citriodora*, 2. *Arundo Donax*, 2. *Buddlea globosa*, pts. of shoots kd., 3. *Camellias*, 2, 3 (see below). *Chimonanthus fragrans*, 3. *Magnolia grandiflora*, pts. of shoots kd., 3. *Mandevilla suaveolens*, 2. *Myrtles*, 3. *Pasiflora cœrulea*, 2.

Plants uninjured—*Araucaria imbricata* (large and small), *Bambusa Metake*, *Camellias*, *Pampas grass*.

Observations — *Camellias*, (1) in open border with W. aspect; Double White, shed all buds, leaves a little browned; but pushing wood-buds stronger than usual, no doubt owing to not having bloomed. Double Red, mottled, uninjured, but flrs. small. Lady Hume's Blush, suffered most, lost half its leaves and set no buds. In good seasons it flowers profusely, the blooms being as fine as any under glass. (2) Under drip of a Silver Fir, 80 ft. high, which has killed Box edging; *Anemone*-fld., and *Bealii* have thriven well, the leaves being the picture of health. (3) S. aspect; *Concinna*, more shaded than next, has no bloom but is not in the least injured. *Rosa Mundi*, not fld. as usual, but not much injured. (4) Single plants in pleasure-grd. are a little browned with no bloom. (5) Covered way, consisting of a span glazed coping to the wall, with S. E. aspect; Dunlop's *Americana* has a fair amount of good bloom. *Bruceana*, fine healthy foliage and flowers. *Delicatissima* has a quantity of fine white flrs., which have opened better than usual. *Donkelaari*, profusely covered with bloom, the flrs. nearly as fine as usual. Double White, has no flrs. Lady Hume's Blush, not in the least injured.

6. WAREHAM, Tyneham.—Th. Bond, Esq.

Gen. Char. of Soil—Mostly a stiff cold clay.

Alt. and Exposure—Much exposed to S. winds and sea fogs; 1 mile from the sea.

Rainfall, 1879 — [Weymouth, dist., 12 ms., W.; alt., 225 ft.; ht., 1 ft.; 39·07 ins., on 196 days].

Min. Temps. and Dates—[Weymouth, dist. 12 ms., W.; Dec. 5th, 18°; Bournemouth, dist., 14 ms., E.; Dec. 7th, 19°].

Plants injured, 1879-80 — *Asparagus*, 1878-9, 1; 1879-80, 3.

Fruit trees—Apples, Nectarines, Peaches, scarcely any fruit in 1880; Plums, tolerably abundant; Fuchsia Riccartoni, large plants, 3.

Plants uninjured—Fuchsia (many kinds), Mandevilla suaveolens (on S. wall), Orange (S. wall and matted in front only).

7. WIMBORNE MINSTER, Canford.—Mr. W. Hinds.

Gen. Char. of Soil—Light with chalk on a gravelly subsoil.

Alt. and Exposure—Lying low and well sheltered.

Rainfall, 1879—[W. Minster, dist., 2 ms.; alt., 338 ft.; ht., 2 ft.; 31.75 ins., on 183 days].

Date of Onset and Duration of Frost—[Mid. Nov. to end of Jan.].

Min. Temps. and Dates—[Bournemouth, dist., 5 ms.; Dec. 7th, 19°: Jan. 21st, 12°: [Lytchett, dist., 6 ms., S.; Jan. 21st, 18°].

Plants injured, 1879-80—3 (1), 5 (2), 5 (3)—Acer, variegated, 3. Apples, 1, 2, 3. Asparagus, 2. Broccoli, 1, 2, 3. Laurel, Bay (recovering), 2. Laurel, common, 3. Roses, 3. *Vegetables*, 1, 2.

Plants uninjured—Erythrina Christa-galli, Habrothamnus elegans and Solanums (by S. wall).

Observations—Owing to the excellent condition of the soil at the time the severe frost set in, about the middle of Nov., our loss has been comparatively insignificant among trees and shrubs. For although hundreds of plants, Conifers and other choice trees and shrubs, were removed, we have hardly sustained the loss of a dozen plants over a large area of pleasure ground. The watery growth of kitchen garden vegetables during the summer, in consequence of absence of sun light, rendered them impotent to stand the severe winter.

1. SOMERSET—BRIDGEWATER, St. Audries.—Mr. J. P. M'Culloch.

Gen. Char. of Soil—Liassic clay and Red marl; also peaty moorland.

Alt. and Exposure—140 ft.; open to Bristol Channel, and exposed to sea breezes.

Rainfall, 1879 — [Bps. Lydeard, dist., 9 ms.; ht., 1 ft.; 36.91 ins., on 209 days].

Date of Onset and Duration of Frost — Three weeks duration from middle of December.

Min. Temp. and Date—[Dec. 2nd ?] 19°.

Plants injured, 1879-80—3 (1), 2 (2), 5 (3)—Broccoli, 1. Cabbages, 2. Camellias, lost buds, 3. Clanthus puniceus, 1. Euca-

lyptus globulus, 3 yrs. old, 23 ft. high, 1. Laurustinus, 3. Ligustrum japonicum, 2. Pampas grass, 3. Picea grandis, 20 ft., top injured, 3.

Plants uninjured—Indian Azaleas, not even buds touched, and all other things uninjured.

2. CHARD, Forde Abbey.—Mr. R. Andrews.

Gen. Char. of Soil—Loam, with a gravelly subsoil.

Alt. and Exposure—in a valley.

Rainfall, 1879—[Cricket St. Thomas, dist., 3 ms., E.; alt., 400 ft.; ht., 1 ft.; 41·23 ins., on 197 days].

Min. Temps. and Dates—Dec. 5th, 22°; Jan. 22nd, 23°.

Plants injured, 1879-80—3 (1), 7 (2), 1 (3)—Arbutus, 1 (1878-79, 2). Chamærops excelsa, 1; (unhurt 1878-9). Escallonia macrantha, 2. Euonymus, vars., 2. Fig, 2. Laurel, common, 2; L. Portugal, 2. Laurustinus, 3. Pampas grass, 2. Penstemons, 1. Roses, many, 1, 2.

Plants uninjured—Andromeda, Aralia (Dimorphanthus) Mandshurica, Aucuba, Brussels sprouts, Borecole, Box, Cabbages, *Conifers* (large collection), Cotoneaster, Cratægus, Cytisus Laburnum, Deutzia crenata (fl. pl.), Elder (vars.), *Fruit trees*, Furze, Garrya elliptica, Holly, Ivy, Kale, Kalmia, Bay Laurel, Lettuce, Lilac, Mahonia, Philadelphus, Phillyrea, Quercus Ilex, Rhamnus, Rhododendron, Ribes, Rosemary, Salisburia adiantifolia, Skimmia japonica, Spinach, Weigela.

3. FROME, Kilmington.—Rev. M. Warburton.

Gen. Char. of Soil—Upper Greensand (Gault), Oolite and chalk.

Alt. and Exposure—From 800 to 900 ft.; exposed table land.

Rainfall, 1879—[Mells Rec., dist., 9 ms.; alt., 342 ft.; ht., 1ft.; 42·98 ins., on 220 days].

Date of Onset and Duration of Frost—Oct. to March, 1880.

Min. Temps. and Dates—[Dec. 2nd ?] 20°: [Mells, dist., 8 ms., N.; Dec. 6th, 10°·5].

Plants injured, 1879-80—6 (1), 2 (2), 7 (3)—Arbutus, 2. Arundo conspicua, 3. Aucuba, 2. Azalea indica, 40 years old, 3. Cytisus Laburnum, 1. Deutzia, 3. Eucalyptus, 1. Euonymus, argenteus, 3; E. aureus, 1. Fuchsia, 40 yrs. old, 1. Laurustinus, 1. Lilac, white, 1. Liriodendron tulipifera, 3. Pampas grass, 3. Sequoia gigantea, 3.

4. FROME, Mells Rectory.—Mr. T. Tickle.

Gen. Char. of Soil—Red loam, over Magnesian conglomerate. Coal-measures clay in the park in some places.

Alt. and Exposure—342 ft.; in a warm valley.

Rainfall, 1879—Ht., 1 ft.; 42·98 ins., on 220 days.

Date of Onset and Duration of Frost—Nov. 13th to Feb. 1st.

Min. Temps. and Dates—Dec. 6th [2nd ?], 10°·5; [Bath, dist., 10 ms., N.; Dec. 2nd, 12°·6].

Plants injured, 1879-80—4 (1), 20 (2), 19 (3)—*Apples*, (pyramids)—Blenheim Orange, 2; Burgess' Fame, 2; Court Pendu Plat, 2; Norfolk Pippin, 2; Pitmaston's Pine, 1; Royal Pearmain, 2; Reine Blanche, 1; Reinette du Canade, 2; Ribston Pippin, 1.—*Arbutus Unedo*, kd. to grd., 2. *Arundo conspicua*, 1. *Aucuba*, 2. *Azaleas* (Ghent), 2. *Berberis Darwinii*, 3; *B. Jamesoni*, 3. *Biota orientalis*, *incurvata*, 2; *B. or.*, var. *falcata*, 3; *B. or.*, var. *antarctica*, 3. *Bupleurum fruticosum*, 3. *Ceanothus azureus*, 3; *C. hybridus*, 2. *Cupressus macrocarpa*, 3. *Cytisus albus*, 3. *Deutzia rosea*, fl. pl., 2. *Eriobotrya japonica*, on S. wall, 3. *Escallonia Ingrami*, on E. wall, 2; *E. macrantha*, on S. wall, 2. *Euonymus*, green and golden, 2. *Exochorda grandiflora*, 3. *Fuchsia coronata*, 1; *F. gracilis*, 2. *Garrya elliptica*, 2. *Juniperus phœnicea*, 3; *J. thurifera*, 2. *Laurel Bay*, 2. *Laurustinus*, kd. to grd., 2. *Leycesteria formosa*, 2. *Ligustrum coriaceum*, 3. *Lonicera fragrantissima*, 3. *Magnolia ferruginea*, 2. *Peaches*, Royal George, on S. wall, 2. *Phillyrea ligustrifolia*, 3. *Phormium tenax*, 3. *Pinus insignis*, small tree well established, 1; *Do.*, large tree, 3. *Retinospora obtusa*, 3. *Spartium junceum*, kd. to 'grd., 2. *Spiræa cantoniensis*, 2. *Thujopsis lætevirens*, 3. *Veronica Traversi*, 3. *Viburnum macrocephalum*, 2.

1. WILTS—MARLBOROUGH, The Green.—Rev. T. Preston.

Gen. Char. of Soil—On chalk.

Alt. and Exposure—472 ft.; exposed to S.

Rainfall, 1879—Ht., 1 ft. 2 ins.; 39·01 ins., on 204 days. R., 1878—35·84 ins. Av. of 10 yrs., 34·36 ins.

Min. Temps. and Dates—Dec. 7th, 13°·4 [Salisbury, dist., 24 ms., S.; alt., 186 ft.; Dec. 7th, 10°: Compton Bassett, dist., 9 ms., W.; alt., 400 ft.; 13°].

Plants injured, 1879-80 — 4 (1), 4 (2)—*Daphne Laureola*, 2. *Eucalyptus globulus*, 1. *Figs*, 2. *Laurustinus*, 2. *Lavander*, 1. *Pampas grass*, 1. *Parsley*, 1. *Skimmia japonica*, 2.

DIVISION VI.—W. MIDLAND COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879, FROM GLOUCESTERSHIRE, HEREFORDSHIRE, SHROPSHIRE, STAFFORDSHIRE, WARWICKSHIRE AND WORCESTERSHIRE.

GLOUCESTERSHIRE. *Rainfall*, the sixth consecutive year of excessive wet (Clifton). The coldest and wettest summer since 1860 (Kempsford). In the first 9 mons., 4 ins., above av. (Frampton). Min. rainfall, Barnwood, alt., 60 ? ft.; ht., 1 ft. 3 ins.; 30·09 ins.: max., Minchinhampton, alt., 640 ft.; ht., 1 ft. 6 ins.; 40·37 ins. *Min. temps.*, Sherborne Park, alt., 400 ft. (?); Dec. 7th, 4°: Preston, about 8°: Cheltenham, alt., 184 ft.; Dec. 1st., 11°·2; Jan. 20th, 10°: Cirencester, Dec. 2nd and 7th, 14°; Jan. 20th, 14°.

Plants injured, 1879-80 — 155 (1), 491 (2), 45 (3), total at 4 places.

HEREFORD. *Rainfall*, the year was remarkable for two dry and three wet periods; viz. *Dry*—Feb. 20th to May 26th, and Oct. 3rd to Dec. 28th: *Wet*—Jan. 1st to Feb. 19th, May 27th to Oct. 2nd, and Dec. 29th to 31st; a total of 26·58 ins., on 182 days (Ross). Min. rainfall, Fownhope, alt., 192 ft.; ht., 1 ft.; 29·64 ins.: max., Longtown, 45·62 ins., on 172 days. *Temps.*—For 14 consecutive months the temp. was below av.; such has not been since 1799 (Ross). *Min. temps.*—Whitfield, Dec. 7th, 8°: Hereford, alt., 275 ft.; 13°·5: Ross., alt., 213 ft.; 13°·8: Croft Castle, Jan. 27th to 29th, 9°: Bryngwyn, Jan. 19th, 15°.

Plants injured, 1879-80—2 (11), 9 (2), 11 (3), total at 3 places.

SHROPSHIRE. *Rainfall*, wet and cold summer: March and last 3 months dry and fine (Cleobury Mortimer). Min. rainfall, Shrewsbury, alt., 240 ft.; ht., 5 ft. 6 ins.; 24·45 ins., on 129 days: max., Oswestry, alt., 470 ft.; ht., 6 ft.; 39·17 ins. *Min. temps.*—Atcham, Dec. 4th, 5th, and Jan. 20th, 9°: Shiffnal, Dec. 7th, 11°; Jan. 20th, 12°: Leaton, alt., 266 ft.; Dec. 2nd, 4th and Jan. 27th, 11°·9: Stokesay, alt., 369 ft.; Dec. 7th, 13°.

Plants injured, 1879-80—6 (1), 3 (2), 3 (3), total at 2 places.

STAFFORDSHIRE. *Rainfall*, no sun or summer, nothing but con-

tinuous rains. The most disastrous year for farmers (Tamworth). Min. rainfall, Shobnall, alt., 156 ft.; ht., 6 ft.; 25·83 ins., on 168 days: max., Alstonfield, alt., 910 ft.; ht., 1 ft.; 44·07 ins., on 165 days. *Min. temps.*, Oakamoor, alt., 350 ft.; Dec 7th, 1°·1: Tean, alt., 470 ft.; 2°; Burton-on-Trent, alt., 160 ft.; Dec. 7th, 5°: Oscott, alt., 460 ft.; 7°·1: Wolverhampton, alt., 500 ft.; Dec. 2nd, 14°: Farley, alt., 638 ft.; Dec. 5th, 17°.

Plants injured, 1879-80—18 (1), 7 (2), 1 (3), total at 2 places.

WARWICKSHIRE. *Rainfall*, Spring very late and summer months cold and rainy. Temp. much below av.; corn late and ill ripened (Coventry). Min. rainfall, Southam, alt., 289 ft.; ht., 1 ft.; 28·23 ins., on 165 days: max., Birmingham, alt., 340 ft.; ht., 8 ins.; 39·12 ins., on 175 days. *Min. temps.*, Charlecote, alt., about 125 ft. (?); Dec. 7th, -3°: Stockton, alt., 289 ft.; -1°: Rugby, alt., 383 ft.; Dec. 7th, 3°·2: Coventry, alt., 288 ft.; Dec. 7th, 5°: Warwick, alt., 230 ft.; Dec. 6th, 4°.

Plants injured, 1879-80—26 (1), 32 (2), 18 (3), total at 3 places.

WORCESTERSHIRE. *Rainfall*, Cold and wet, except Oct., Nov. and Dec. (Evesham, Kidderminster). Min. rainfall, Stoke Reformatory, alt., 225 ft.; ht., 1 ft. 3 ins.; 27·71 ins., on 137 days: max., Upper Bittall Res. Bromsgrove, alt., 518 ft.; ht., 3 ft.; 36·37 ins., on 179 days. *Min. temps.*, Impney Park, alt., 190 ft. (?); Jan. 20th, 6°: Hanbury Hall, Dec. 7th, 9°: Gt. Malvern, alt., 800 ft.; Dec. 7th, 10°; Jan. 20th, 13°.

Plants injured, 1879-80—12 (1), 24 (2), 14 (3), total at 3 places.

REPORTS.

1. GLOUCESTERSHIRE — BRISTOL, Bitton Vicarage. — Rev. H. N. Ellacombe.

Gen. Char. of Soil—Good alluvial, an old garden.

Alt. and Exposure—About 60 ft.; aspect, S.

Rainfall, 1879—35·62.

Min. Temps. and Dates—Oct. 16th, 29°; Nov. 15th, 22°; Dec. 7th, 16°·4.

Plants injured, 1879-80—60 (1), 19 (2), 21 (3)—*Abelia triflora*, 1. *Agapanthus umbellatus*, 1. *Arnica Zygomeris*, 3. *Aphyllanthus monspeliensis*, 2. *Aristolochia sempervirens*, 3. *Arundo Donax*, 2. *Bambusa tesellata*, 3. *Bignonia capreolata*, 2. *Boehmeria*

nivea, 1. Bousingaultia baselloides, 3. Bravoa geminiflora, 2. Can-
na achiras, 1. Cantua dependens, 3. Capparis spinosa, 3. Cassia
marilandica, 2. Ceanothus azureus, 3. Cerasus ilicifolia, 1. Cha-
mærops Fortunei, 1. Cistus (many kinds), 1. Clerodendron fœti-
dum, 1. Colletia Bictoniensis, 1. Colutea arborescens, 1. Com-
melyna cœlestis, 1. Dahlia glabrata, 1. Daphne indica, 1. Dee-
ringia celosioides, 1. Diplacus glutinosus, 1. Dracæna australis, 2.
Drimys Winteri, 1. Edwardsia microphylla, 1. Eugenia Ugni, 1;
E. apiculata, 1. Euonymus fimbriatus, 1. Fabiana imbricata, 2.
Fuchsia conica, 1; F. alpestris, 1; F. lycioides, 1. Genista sagit-
talis, 1. Gunnera scabra, 3. Gymnothrix latifolia, 1. Hedychium
Gardnerianum, 2. Helianthemum, many sp., 1. Hibiscus grandi-
florus, 3. Hyacinthus candicans, 2. Hypericum balearicum, 1.
Indigofera Dosua, 3. Jasminum revolutum, 1. Kniphofia Mac-
Oweni, 1. Lagerstrœmia indica, 3. Libertia ixioides, 3; L. grandi-
flora, 3. Limoniastrum monopetalum, 1. Lithospermum frutico-
sum, 1. Lycium purpureum, 1. Mahonia trifoliata, 1. Mande-
villa suaveolens, 1. Margyricarpus setosus, 1. Mesembryanthem-
um uncinatum, 1. Metrosideros robustus, 1. Muhlenbeckia ya-
rians, 1. Myrsiphyllum asparagoides, 1. Olea europæa, 3. Ore-
daphne californica, 2. Othonia cheirifolia, 1. Oxalis, many species,
1. Passiflora cœrulea, 1; P. lutea, 2. Phormium tenax, 2. Phy-
gelius capensis, 1. Physianthus albus, 1. Pistacia vera, 2. Podo-
carpus chilensis, 2. Quercus glabra, 1. Raphiolepis japonica, 2.
Rodgersia podophylla, 2. Rosa bracteata, 3. Rubus australis, 1;
R. rosæflorus, 2. Sisyrinchium californicum, 1; S. multiflorum, 1.
Solanum jasminoides, 1; S. glaucophyllum, 1. Stokesia cyanea, 1.
Swammerdamia antennarea, 1. Tecoma amabilis, 1; T. grandiflora,
1. Teucrium fruticans, 1. Thea viridis, 1. Tripsacum dactyloides,
2. Tristania conferta, 2. Tritoma aurea, 1. Veronica pinguifolia,
3; V. decussata, 1. Vitis heterophylla, 3; V. incisa, 3. Wood-
wardia radicans, 1. Yucca aloifolia, var., 3; Y. filamentosa, var., 3;
Y. Whipplei, 1; other sp., 3.

Plants uninjured—Acanthopanax variegata, Actinidia polygamia,
Ægle sepiaria, Ardisia japonica, var., Aristolochia rotunda, Bam-
busa Metake, B. Kumasasa, Choysia ternata, Corypha australis, Dasy-
lirion Biglowi, Desfontainea spinosa, Eulalia, Fuchsia macrostemma,
Hymenanthera cissifolia, Kniphofia caulescens, Montbrettia Pottsii,
Nandina domestica, Olearia Haastii, Pistacia Lentiscus, Pterostyrax

hispidulum, Rhyncospermum jasminoides, Richardia albo-maculata, Rosicea purpurea, Sauromatum guttatum, Senecio pulcher, Vella pseudo-cytisus, Xanthoceras sorbifolia.

Observations—All these plants were entirely unprotected, except that some were in more sheltered places than others.

2. CIRENCESTER, Preston House.—H. T. Elwes, Esq.

Gen. Char. of Soil—Thin, but rather sticky and poor, resting on Oolite brash.

Alt. and Exposure—About 300 ft.; not much sheltered.

Rainfall, 1879—From 12 to 20 ins. above the av. During the six spring and summer months, double the average.

Date of Onset and Duration of Frost—The severest frost was in the first fortnight of Dec.

Min. Temp. and Date—In first week of Dec. about 8°, without any snow or strong wind. [Cirencester, Agr. Col., dist., 2 ms.; Dec. 17th, 14°].

Plants injured, 1879-80—60 (1), 11 (2), 3 (3)—Agapanthus Moorei, survived 1878-9, 1. *Alpine plants*, more died in autumn and winter than ever before. Amicia zygomeris, survived 1878-9, 1. Arum crinitum, 1; A. cornutum, 1. Berberis Darwinii, old plants, 2; B. Knightii, 2 in 1878-9, 1. Brodiaea, 1. Brugmansia sanguinea, survived 1878-9, 1. Calochorti (excepting some newly planted), 1. Cannas, 1. Cantua dependens, 1 in 1878-9, 1. Cistus, 15 sp. (excepting C. ladaniferus), 1, 2; Clintonia Andrewsii, 1; C. umbellata, 1. Colletia Bicktoniensis, 1 in 1878-9, 1. Convolvulus Cneorum, 1 in 1878-9, 1. Corbularia, in open ground, all, 1; in frames, 1, 2. Dietes Huttoni, 1. Diplopappus chrysophyllum, 2; D. filifolius, 1 in 1878-9, 1. Edwardsia grandiflora, 2; E. microphylla, 1. Eryngium bromeliæfolium, 1; E. pandanifolium, 1. Eucalyptus, all species, 1. Euphorbia myrsinites, old plants, 1. Eurybia ramulosa, 1. Fabiana imbricata, 1. Francoa sonchifolia, 1. Fuchsia procumbens and several of hardest species, 1 in 1878-9, 1. Gladioli, nearly all rotted in autumn; G. Colvillei albus, 1; G. dracocephalus, 1; G. fulgens, 1; G. psittacinus. Habranthus pratensis, in frame, 1. Hedychium, 1. Hyacinthus candicans, in open ground, 1. Indigofera Roylei, 2. Iris cretensis, 1; many sp. from N. America, Japan and Himalayas, 1. Kniphofia caulescens, half plant killed, 2; K. Saundersii, 1; K. M'Oweni, 1; K. quartiniiana, 1. Larch (see be-

low). *Laurustinus*, 2, 1878-9; 1. *Libertia formosa*, 1. *Lithospermum prostratum*, 1. Lilies, by wet summer 1879, 2; *Japanese*, e.g. *auratum*, *japonicum*, *longiflorum*, *tigrinum* &c., 1; *American*, have stood better; but many will only live a year or two. *Mahonia fascicularis*, on S. wall, 3; *M. Fortunei*, 2; *M. nepalensis*, 2. *Mecopopsis aculeata*, 1; *M. nepalensis*, 1; *M. Wallichii*, 1. *Melianthus major*, 3. *Millas*, 1. *Mitraria coccinea*, 1, 1878-9; 1. *Narcissi*, many small and delicate species, e.g. *N. triandrus*, 2; dead or weak, 1880; *N. elegans*, 1; *N. juncifolius*, 1; *N. pachybolbus*, in frame, 1. *Olea fragrans*, put out Oct. 1879, cut to near grd., 2. *Olearia Haastii*, 3; growing well, 1880. *Ourisia coccinea*, 1. *Paranephelius uniflorus*, 1. *Pavia macrostachya*, by wet summer, 1. *Phormium tenax*, 1. *Polygonum vacciniifolium*, 2. *Primula capitata*, 1. *Rhinopetalum Karelini*, 1. *Romanyoffia malaschkensis*, 1; *R. sitchensis*, 1. *Schizophragma hydrangeoides*, probably by spring, 1. *Sparaxis pulcherrima*, 1. *Stokesia cyanea*, 1. *Styrax officinale*, 1. *Solanum jasminoides*, 2, 1878-9; 1. *Swertia speciosa*, 1. *Veronica devoniensis*, *V. pinguifolia*, &c., 1. *Xiphions*, mostly, 1 or 2, (even *X. reticulatum*); *X. filifolium*, 1; *X. tingitanum*, 1.

Plants uninjured, 1879-80 — *Arisæma concinnum*, *A. curvatum*, *A. Sieboldi*, *Aralia spinosa*, *Asparagus racemosus*, *Bomarea Salsilla*, *Calceolaria crenatiflora*, *Calochorti*, (some newly planted), *Chrysobactron Hookeri*, *Cistus ladaniferus*, *Edwardsia grandiflora*, *Eucomis punctata*, *Euphorbia myrsinites*, self-sown; *Fritillaria Forbesi*, *Fuchsia coccinea*, (under warm wall), *Gladiolus Saundersi* (young bulbs), *Indigofera Roylei*, *Kniphofia caulescens* (half plant kd.), *Korolkowia Sewerzowii*, *Larix sikkimensis*, 2 years old, *Lilium pardalinum* (vars., attacked by a *Peronospora* (?), July 1879, have come up fairly well, 1880), *Mahonia fascicularis*, *Melianthus major*, *Richardia albomaculata*, *R. melanoleuca*, *Senecio pulcher*, *Solaria microscioides*, (in frames), *Tecophileia cyanocrocus*, *Tropæolum polyphyllum*, Tulips (all quite hardy), *Veronica devoniensis*, self-sown, *V. pinguifolia*, *V. Traversi*, *Watsonia coccinea*.

Observations—Herbaceous plants—Many from N. America which will stand the severest frosts were so much weakened by the cold and wet that they rotted in the ground. Many S. European herbaceous plants, usually considered hardy, suffered the same fate. *Farm crops*—The effect of the year on farm crops was most disastrous. Neither grass, corn, roots, or any other crop came to ma-

turity. Very few seeds ripened. Cattle and sheep were more unhealthy than they have been since 1860-1. *Larch plantations*—Of five to twenty years of age, have been much injured by various insects and other disease, induced no doubt by the long continuance of cold and wet. *Copsewood*—Newly cut made little or no growth, and in some cases the stools died. For game it was the worst season I ever remember; and with the exception of a few Himalayan and Japanese plants, noxious weeds and slugs, no animal or vegetable life has thriven. In considering the general results of the period from November 1878 to the present time, I should remark that though the degree of cold registered was by no means so great in Gloucestershire as in many other parts of England; yet a careful investigation of the weekly meteorological reports published in the *Times*, shows that the excess of rainfall above the average and the deficiency of heat and sunshine below the average, were greater in the West Midland counties, during the year 1879, than in any other part of the kingdom. To this cause, and not to the length and severity of the winters of 1878-9 and 1879-80, I attribute the great losses in my garden which from one cause or other amount to as much as 500 or 600 species of plants.

2. CIRENCESTER, Royal Agr. College.—Mr. H. Miller.

Gen. Char. of Soil—Calcareous.

Alt. and Exposure—434 ft.; exposed.

Rainfall, 1878—38·39 ins.

Date of Onset and Duration of Frost—Nov. 15th to 16th, 20th to Dec. 27th, Jan. 8th, 1880, to Feb. 2nd.

Min. Temps. and Dates—Dec. 2nd, 3rd and 7th, 14°; Jan. 20th, 14°.

Plants injured, 1879-80—9 (1), 2 (2), 1 (3)—*Broccolis*, all, 1; *viz.* Elletson's Mammoth, Knight's Protecting, Purple Sprouting, Snow's Winter White, Sutton's Late Green, Sutton's Protecting, Sutton's Reading Giant, Wilcove White. Brussels sprouts, Roseberry's, 1. *Buxus balearicus*, 2. Cabbages, Savoy's, all, 1; *viz.* Drumhead, Green curled, Nonpareil, Wheeler's Imperial. *Cupressus Lawsoniana*, 1. *Euonymus radicans*, 1. Kale, Cottagers, 1; K., Scotch, 1. Laurel, Bay, 2. Lettuce, black-seeded Bath Cos, 1. Pampas grass, 1. *Picea Nordmanniana*, 3. *Roses*, all, 1; *viz.* (1) *Dwfs.* (all grafted on Manetti), Annie Laxton, Dr. Hooker, Elie Morel, Jean Lambert, Madame Loine Giesson—(2) *Stand.*, (on common Briars), Car-

dinal Wolsey, Gloire de Dijon (pink), Madame Falcot, Mrs. Baker, Reve. d'Or.

3. NORTHLEACH, Sherborne Park.—Mr. A. Scott.

Gen. Char. of Soil—Various, but for the most part heavy and wet, on a subsoil of limestone and clay.

Alt. and Exposure—About 400 ft.; in a valley with a hill on the S. side and on the N. The garden slopes gradually to the N.

Rainfall, 1879—35·65 ins.

Date of Onset and Duration of Frost—Nov. 14th till Feb. 2nd, except now and then, when the temp. at night was a little above freezing.

Min. Temps. and Dates—Dec. 7th, 4° [Cirencester, dist., 11 ms.; alt., (about 350 ft. ?); Dec. 2nd and 7th, 14°].

Plants injured, 1879-80—9 (1), 8 (2), 7 (3)—Apples (dessert), e.g., Adam's Pearmain, 1; others, 2: (kitchen), e.g. Alfreton, 2. The Apple crop in 1880, a complete failure. Apricots, on S. wall, 3, but fruit good in 1880. Borecoles, of sorts, 2. Box, 3. Broccoli, 1. Brussels sprouts, 2. Chimonanthus fragrans, on S. wall, 1. Figs, on S. wall, 1. Jasminum officinale, on S. wall, 1. Laurel, Bay, 1. Laurel, common, 2; L. Portugal, 3. Laurustinus, 1. Magnolia grandiflora, on S. wall, 2. Nectarines, on S. wall, 3. Pears, Pyramids, 3; crop in 1880, about half. Roses, of sorts, on S. wall, 1; Tea, all, 1, 2, except Bouquet d'Or, 3; some Teas, on own roots, have sprung from below grd., 1880. Spinach, winter, 2. Yew, 3.

Plants uninjured—Apples, Codlins were the only sorts. Broccolis, laid down with heads to N., were quite untouched.

4. TEWKESBURY, Forthampton Court.—Mr. J. Wyber.

Gen. Char. of Soil—Light and sandy, with a gravelly subsoil.

Alt. and Exposure—About 8 ft., above the Severn floods. Partly sheltered by trees.

Rainfall, 1879—29 ins.

Min. Temps. and Dates—[Gt. Malvern, dist., 9 ms. N.W.; alt., 550 ft. ?; Dec. 7th, 10°: Cheltenham, dist., 8 ms., S.E.; Dec. 1st, 11°·2].

Plants injured, 1879-80—4 (1), 8 (2), 9 (3)—Apples, 3. Apricots, 3. Asparagus, 3. Broccoli, 1. Cherries, 2. Fuchsias, 2. Figs, unprotected on S. wall, 2. Kale, 1, 2. Laurustinus, 3. Magnolia grandiflora, 3. Myrtles, 2. Peaches, 1, 2, 3. Pears, 3. Potatoes, 1, 2, 3. Roses, only 1 kd. to grd., 2. Vines, 3.

Observations—[Effects in 1880]—Apples made too much wood

and few fruit buds; crop scarce. Apricots, 6 fine young trees died; old trees blossomed but little, the leaves being mildewed and fruit scarce. Asparagus, mainly injured by frost. Broccoli, not 2 p. c. survived. Figs, all young wood required cutting hard back, no fruit. Peaches, had few blossoms, no fruit; the wood being strong and unripened. Pears, injured by too much wet; no fruit on standards; good crop on S. wall. Vines, injured by too much wet; many shanked in 1879; bunches small and few in 1880.

1. **HEREFORDSHIRE**—**HEREFORD**, Bryngwyn.—J. Rankin, Esq., M.P.
Gen. Char. of Soil—Clay loam.

Alt. and Exposure—420 ft. Exposure to S. E.

Rainfall, 1879—33·76 ins., on 186 days: max., Aug. 5·18 ins.; min., Nov., ·72 ins.

Date of Onset and Duration of Frost—Dec. 3rd to 26th; from Jan. 9th to 13th; from Jan. 17th to 31st.

Min. Temps. and Dates—[Ross, dist., 8 ms., S.; alt. 213 ft.; Dec. 7th, 13°·8: Hereford, dist., 6 ms.; alt., 275 ft.; Dec. 7th, 13°·5]; Jan. 19th, 15°.

Plants injured, 1879-80—10 (1), 6 (2), 6 (3)—Apples, 2. Arbutus, 3; suffered more in 1878-9. Berberis Darwinii, some killed in 1878-9, 3. Ceanothus azureus, 2; C. grandiflorus, 3. Cherries, 3. Cistus, 1. Escallonia macrantha, 3. Eucalyptus, globulus, 1. Euonymus latifolius aureus, 3. Furze, 1; Do., fl. pl., 1. Hydrangea, 1. Laurustinus, very much injured, 1878-9. Oak, a golden, injured by wet summer, dying at ends of branches, 2. Pampas grass, in wet clay soil, 1. Peaches, failed to ripen wood in 1879, 2. Roses, Dwfs., a few on own roots, injured; Standards, 1; some few Briars, 1; Teas, 1. Spartium junceum, 2. Tritomas, 1. Veronicas, various, 1.

Plants uninjured—Apricots. Conifers are not in the least injured either by wet or frost; except some few on a wet clay soil. All kinds of Conifers thrive well here. *Deciduous trees* do not seem to have suffered from the wet or frost; excepting one large Golden Oak (see above). Laurustinus. Plums. Roses, most of Dwfs., on own roots.

2. **HEREFORD**, Whitfield.—Mr. W. Wheatley.

Gen. Char. of Soil—Garden soil of a moderately stiff loam; gen. char. is a stiff red clay of Old Red Sandstone formation.

Alt. and Exposure—About 440 ft.; sheltered on E. by hill. Aspect S. to S. W.

Rainfall, 1879—34·04: max., June, 7·84 ins.; min., Nov., ·61 in.

Date of Onset and Duration of Frost—Oct. 16th. Last frost on May 1st. Longest continuation from Nov. 25th to Dec. 28th; total, 34 days and nights.

Min. Temp. and Date—Dec. 7th, 8° [too low, or on grd.? Hereford, alt., 275 ft.; Dec. 7th, 13°·5; on grass, 8°·9].

Observations — I am not aware of any directly bad effects on plants. Leading shoots of the Apple trees were cut off by the frost in a very unusual manner. There have been very few apples this year, 1880. The foliage of deciduous trees has been very abundant; of evergreen Conifers, small.

2. KINGSLAND, Croft Castle.—Mr. W. Bytheway.

Gen. Char. of Soil—Light with limestone below.

Alt. and Exposure—About 200 ft.; sheltered on N. by elevated ground.

Rainfall, 1879—[Leominster (Farm), dist., 5 ms.; alt., 240 ft.; ht., 1 ft.; 30·20 ins., on 213 days].

Date of Onset and Duration of Frost—Nov. 14th, with slight intermissions until the end of Dec.; and from Jan. 20th to 31st.

Min. Temps. and Dates—[Stokesay, dist., 10 ms., N.; alt., 369 ft.; Dec. 7th, 13°] Jan. 27th, 28th and 29th, 23°: [Churchstoke, dist., ~25 ms. N.W.; alt., 549 ft.; Jan. 20th, 13°·2].

Plants injured, 1879-80—2 (1), 3 (2), 4 (3)—Asparagus, strong in spring, 1879, 2. Borecole, 3. Broccoli, 1, 2, 3. Brussels sprouts, 3. Cabbages, 3. Carnations, nearly all, 1. Nectarines and Peaches, against walls, unprotected, 2.

Plants uninjured—*Abies Douglasii*, *A. excelsa*, Apples (bore little fruit, 1880), Apricots, *Araucaria imbricata*, *Buddlea globosa* (on wall), Camellias (on wall), Carrots (small), *Cedrus Deodara*, Celery (first sowing good, second small), *Cryptomeria japonica*, *C. elegans*, *Cupressus Lawsoniana*, *C. L. erecta viridis*, Common Laurel, *Herbaceous* plants (excepting Carnations) all uninjured, *Laurustinus*, *Magnolia grandiflora* (on wall), Onions (many thick necked), Pears (bore little fruit), Plums (a moderate crop), Pomegranate (on wall), Roses (Dwfs and Stands. mulched), *Thuja gigantea*, *T. orientalis aurea*, *Thujopsis borealis*.

Observations—*Conifers*, there are many fine specimens of some of

the trees above mentioned. *Deciduous* trees, Beeches, Elms, Oaks and Spanish Chestnuts grow here to very fine timber, although so near the rocky strata. Laurel hedges are very large, and in good health; not suffered in the slightest degree. Nectarines and Peaches, some of the branches were quite killed, and others had the "curl" very much. The wood did not ripen. *Vegetables*, of Borecoles, Dickson's is best, then Wheeler's Imperial and Enfield Market; of Broccolis, Knight's Protecting and Dickson's Late stood the best.

1. SHROPSHIRE — MARKET DRAYTON, Buntingsdale. — Mr. H. Coombs.

Gen. Char. of Soil—A light loam with a dry subsoil of sand and gravel.

Alt. and Exposure—276 ft.; exposed to N. E. and W.

Rainfall, 1879—31·68 ins., on 174 days.

Date of Onset and Duration of Frost—Nov. 2nd to 5th; Nov. 15th to 23rd; Dec. 1st to 27th; Jan. 15th to Feb. 2nd, with slight frosts for 11 nights in Feb.

Min. Temps. and Dates—Nov. 2nd and 20th, 18°; Dec. 2nd, 14°; 5th, 13°; 7th, 10°; Jan. 20th and 27th, 12°; 28th and 29th, 17°.

Plants injured, 1879-80—4 (1), 1 (2), 2 (3)—*Antirrhinums*, 1. *Apricots*, 1. *Laurel Bay*, 1. *Laurel common*, 3. *Myrtle*, 2. *Pens-temon*, 1. *Picea Pinsapo*, 3.

Observations — Apples, bore only half a crop and very poor in quality. Pears, very scarce. Plums, very few, excepting Damsons, of which there was a fair crop. Currants, Gooseberries, Raspberries and Strawberries were all plentiful and fairly good in 1880.

2. SHREWSBURY, Atcham.—Mr. G. Pearson.

Gen. Char. of Soil—Loam and gravel.

Alt. and Exposure—Rather low, between the two rivers, Severn and Tern.

Rainfall, 1879—[Shrewsbury, dist., 4 ms.; alt., 240 ft.; ht., 5 ft. 6 ins.; 24·45 ins., on 129 days].

Date of Onset and Duration of Frost—Nov. 20th to Dec. 27th, and Jan. 5th to 30th.

Min. Temps. and Dates—Dec. 4th and 5th, 9°. [Leaton, dist., 5 ms., E.; alt., 266 ft.; Dec. 4th and Jan. 27th, 11°-9].

Plants injured, 1879-80—2 (1), 2 (2), 1 (3)—*Euonymus japo-*

nicus, golden vars., 1. *Hypericum calycinum*, cut to grd., but fld. well, 1880, 2. Laurel, Bay, 2. Laurel, common, young shoots browned, 3. *Picea lasiocarpa*, roots partly diseased by fungus, 1.

1. STAFFORDSHIRE—BILSTON.—H. D. Best, Esq.

Alt. and Exposure—[About 460 ft.]—A cold, smoky district.

Rainfall, 1879—[Wolverhampton, dist., 3 ms., W. ; alt., 459 ft. ; ht., 3 ft. 4 ins. ; 30·44 ins., on 218 days].

Min. Temps. and Dates—[Oscott, dist., 7 ms., E. ; Dec. 7th, 70·1 : Wolverhampton, dist., 3 ms. ; Dec. 2nd, 14°].

Plants injured, 1879-80—Planes, 50 trees planted along the main street in 1876, all did well, till the winter 1879-80 ; when one only survived. The trees that died had a spreading habit, with broader and more deeply lobed leaves than the one which survived. This tree has a compact habit, and its leaves are toothed but not lobed.

2. BURTON-ON-TRENT, Dunstall Hall.—Sir J. Hardy, Bart.

Gen. Char. of Soil—Gravel and marl.

Alt. and Exposure—High and level, exposed to E. winds.

Rainfall, 1879—[Burton-on-Trent., alt., 160 ft. ; ht., 1 ft. ; 28·96 ins., on 208 days].

Date of Onset and Duration of Frost—Hardest frosts, from Dec. 8th until near Christmas. From end of Jan. till Feb. 10th.

Min. Temps. and Dates—[Trent College, dist., 14 ms., E. ; alt., 120 ft. ; Dec. 6th, -3° : Burton-on-Trent, alt., 160 ft. ; Dec. 7th, 2°].

Plants injured, 1879-80 — 17 (1), 7 (2), 1 (3)—Apples, 1, 2. *Aucuba*, 2. *Berberis*, 3. Broccoli, 1. Cabbage, 1. *Cedrus Deodara*, 1, 2. *Clematis Jackmanni*, 1. *Daphne Mezereum*, 1. *Euonymus japonicus*, 1. Furze, fl. pl., 1. *Jasminum*, white, 1, 2. *Laurustinus*, 1. Lavander, 1. *Lonicera*, golden, 1. Pears, 2. Plane, 1, 2. Poplars, 1. Rosemary, 1. Roses, Tea, 1, 2. *Tritoma uvaria*, 1. Wallflowers, 1.

1. WARWICKSHIRE—RUGBY, Stockton Rectory.—Rev. W. Tuckwell.

Gen. Char. of Soil—Stiff blue Lias clay.

Alt. and Exposure—289 ft. ; fairly sheltered.

Rainfall, 1879—28·23 ins., on 165 days.

Date of Onset and Duration of Frost—Nov. 21st to Dec. 28th. Short thaw, then frost from Jan. 9th to Feb. 4th.

Min. Temps. and Dates—Dec. 7th, $-1^{\circ}0$ [Rugby, dist., 8 ms., N.; alt., 383 ft.; Dec. 7th, $3^{\circ}2$: Warwick, dist., 9 ms., W.; 4°].

Plants injured, 1879-80—11 (1), 8 (2), 2 (3)—*Adonis vernalis*, 1. *Arbutus Unedo*, 1. *Berberis Darwinii*, kd. to grd., (now shooting, July 1880), 2. *Cedrus Deodara*, 30 yrs., in fine condition, 1. *Forsythia viridissima*, on S. W. wall, 1, 3; (one plant unhurt). *Hypericum calycinum*, 2. *Jasminum revolutum*, 2. Laurel, common, cut nearly to grd., 2; L. Portugal, do., 2. *Lavatera arborea*, 1. *Lonicera, aureo-reticulata*, kd. nearly to grd., 2. *Magnolia grandiflora* (beginning to shoot, July 1880), 2. *Mahonia aquifolia*, 3. *Morina longifolia*, 1. Pampas grass, 1. *Polycarpon tetraphyllum*, 1. *Roses*, all newly budded, Standards and Tea, 1. *Ruscus aculeatus*, 2. *Ruta graveolens*, generally kd. here, 1. *Sisymbrium Irio*, 1. *Tritoma uvaria*, 1.

2. STRATFORD-ON-AVON, Charlecote.—Mr. T. Rodger.

Gen. Char. of Soil—A very adhesive loam.

Alt. and Exposure—[About 125 ft. ?]—The kitchen garden is sheltered by large elm trees on N. The slope is considerable down to the river Bourne.

Rainfall, 1879—[Stratford-on-Avon, dist., 4 ms.; alt., 123 ft.; ht., 8 ins.; 30.28 ins.].

Date of Onset and Duration of Frost—About Dec. 5th to 25th; then mild weather till middle of Jan. 1880; followed by frost for 5 weeks.

Min. Temps. and Dates—[Dec. 7th ?] 3° ; [Warwick, dist., 6 ms., N.; Dec. 6th, 4° : Stockton, dist., 12 ms., N.E.; Dec. 7th, -1°].

Plants injured, 1879-80—2 (1), 4 (2), 2 (3)—Apricots, 2. Borecole, 2. Broccoli, 1. Cabbages, 2. Celery, 2. Peaches, Dr. Hogg, 1; others, 3. *Roses*, 3.

Plants uninjured—*Cedrus Atlantica*, *C. Deodara*, *Cupressus Lawsoniana*, *C. macrocarpa*, *Sequoia gigantea*, *Thuja or. elegantissima*, *Thujopsis borealis*.

3. WARWICK, The Priory.—Mr. R. Greenfield.

Gen. Char. of Soil—Light and sandy on Red Sandstone rock.

Alt. and Exposure—230 ft.; sheltered on N. and N. W.; exposed on S. and S. E.

Rainfall, 1879—32 ins., [on 197 days (Leamington), dist., 2 ms.].

Date of Onset and Duration of Frost—Nov. 10th to Feb. 24th; 86 nights of frost.

Min. Temps. and Dates—Dec. 7th, 4° [Stockton, dist., 9ms., E., -1°].

Plants injured, 1879-80—13 (1), 20 (2), 14 (3)—*Araucaria imbricata*, 3. *Arbutus Unedo*, 2. *Aucuba japonica*, 3; *A. himalayica*, 2. Broccoli, many vars., all, 1. Carnations and Piccotees, 1, 3. *Catalpa syringæfolia*, 3. *Ceanothus dentatus*, 1. *Cedrus atlantica*, 3; *C. Deodara*, some, 1; others near river, lost foliage, 2; *C. Libani*, 3. *Cupressus Lawsoniana*, 3. *Cytisus albus*, 1; other vars., 2, 3. *Escallonia macrantha*, 1. *Eucalyptus globulus*, 25 ft., 1. *Euonymus japonicus*, 1. Figs, 2. Furze, fl. pl., 2. *Hypericum calycinum*, kd. to grd., 2. Holly, 30 vars., leaves and strong young shoots much cut, 2. Laurel, Bay, 2. Laurel, common, young plant, 2; older, 3; Do., var. *rotundifolia*, 3; Do., var., *caucasica*, 3. *Laurustinus*, 2. Lavander, 2. *Magnolia grandiflora*, 2. Pansies, 3. *Passiflora cœrulea*, stood 6 winters, 1. *Paulownia imperialis*, 1. *Picea bracteata*, 1; *P. lasiocarpa*, lost most of foliage, 2; *P. Pinsapo*, do., 2; *P. Webbiana*, 1. Rosemary, 2. *Roses*—Bourbon, China, H. P.'s, Noisette and Tea, 1; Climbing *devoniensis* in a S. aspect, 2. *Sequoia gigantea* and vars., 3. *Taxodium mexicanum*, 3; *T. sempervirens*, albo spica, 2. Yew, hedges pruned in autumn, kd. on both sides, 2. *Yucca recurva*, 2.

1. WORCESTERSHIRE—DROITWICH, Hanbury Hall.—Mr. G. Oliver.

Gen. Char. of Soil—Clayey loam on red marl.

Rainfall, 1879—April to Sept., inclusive, 11·72 ins. [Worcester, dist., 9 ms.; ht., 1 ft.; 28·62 ins., on 186 days].

Date of Onset and Duration of Frost—Nov. 10th to Dec. 13th. Then no frost until Jan. 8th. Frost from Jan. 8th to Feb. 8th. Six other frosts in Feb. and six in March.

Min. Temp. and Date—Dec. 7th, “23 degrees” [=9°?].

Plants injured, 1879-80—8 (1), 13 (2), 3 (3)—*Arbutus*, 1. Artichoke, globe, 2. *Aucuba japonica*, 2, 3. Broccoli, 1, 2. *Ericas*, 1, 2. Laurel, Bay, 2, 3. *Laurustinus*, 2, 3. *Magnolia grandiflora*, 3. Myrtle, 1, 2. Nectarines, 1, 2. Peaches, 1, 2. *Quercus Ilex*, 2. *Roses*, 1, 2. *Tritomas*, 2. *Veronicas*, 1. *Yucca gloriosa*, 2.

2. DROITWICH, Impney Park.—Mr. M. Temple.

Gen. Char. of Soil—A heavy marly loam, generally tenaceous and cold, but well drained.

Alt. and Exposure—About 180 to 200 ft.; exposed to N., N. W., and W.

Rainfall, 1879—Very wet ; [Worcester, dist., 7 ms. ; 28·62 ins., on 186 days].

Date of Onset and Duration of Frost—Oct. 20th, and scarcely without intermission till the middle of April.

Min. Temps. and Dates—[Hanbury Hall, dist., 4 ms. ; Dec. 7th, "23 degrees" [= 9° ?] ; Jan. 20th, 6° [too low, or on grd. ?]

Plants injured, 1879-80—2 (1), 8 (2), 2 (3)—*Araucaria imbricata*, 3. *Asparagus*, 2. *Broccoli*, 2. *Broom*, a few, 1, many, 2, 3. *Laurel*, common, several hundreds, 2. *Magnolia grandiflora*, on wall, 2. *Parsley*, 2. *Quercus Ilex*, 2. *Roses*, 1, 2.

Plants uninjured—Fruit trees, excepting the later kinds of Apples, did well. Pears, generally fine in size and quality, 1880. Vegetables, none suffered except those mentioned.

Observations—Most of the shrubs showed signs of suffering from the severity of the frost ; but as the season advanced, they started freely and no serious injury appears to have resulted. The ground is well drained. Shrubs and trees in low places suffered most.

3. GREAT MALVERN.—Mr. J. Jaques.

Gen. Char. of Soil—A stiff loam resting on red marl.

Alt. and Exposure—About 800 ft. ; fully exposed to S. ; partially to S. E.

Rainfall, 1879—[Alt., 550 ft. ; ht., 6 ins. ; 34·22 ins., on 179 days].

Date of Onset and Duration of Frost—Dec. 7th, temp. fluctuated very much until end of Jan., 1880.

Min. Temps. and Dates—Dec. 7th, 10° ; Jan. 20th, 13°. [Orleton, dist., 14 ms., N.W. ; Dec. 7th, 13° ; Jan. 20th, 14°·8].

Plants injured, 1879-80—2 (1), 4 (2), 8 (3)—*Arbutus Croomii* (in low situation), 1 ; *A. Unedo*, partly shaded by trees, 3. *Broccoli*, 2. *Cistus formosus*, shaded by trees, 3. *Elæagnus argenteus*, exposed to E., shaded on S., 2. *Escallonia macrantha*, in open, 3 ; *E. montevidensis*, on E. wall, 1. *Garrya elliptica*, partly under trees, 3. *Hypericum calycinum* (recovered), 2. *Laurel*, Bay, partly shaded by trees, 3. *Magnolia grandiflora*, on S. wall, recovered, 3. *Philesia buxifolia*, in low, damp and shady place (partly recovered), 3. *Photinia serrulata* (quite recovered), 3. *Roses*, Tea (all recovered), 2.

Plants uninjured—*Garrya elliptica* (exposed), *Escallonia mac.* on E. wall, Bay *Laurel* and *Laurustinus* in the open and well exposed.

DIVISION VII.—N. MIDLAND COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879, FROM DERBYSHIRE, LEICESTERSHIRE, LINCOLNSHIRE, NOTTINGHAMSHIRE AND RUTLANDSHIRE.

DERBYSHIRE. The coldest Jan., the wettest Feb., and the driest March (except March, 1875), in the Trent Records (Trent College). Cold, damp and sunless (Spondon, Derby, &c.). *Rainfall*, min., Trent Col., alt., 120 ft.; ht., 1 ft.; 25·60 ins., on 171 days: max., Buxton, alt., 989 ft.; ht., 5 ft.; 51·90 ins., on 200 days. Heavy hay crop, corn harvest very bad, not all gathered before the end of Oct. *Min. Temps.*, Buxton, alt., 990 ft.; Dec. 7th, $-3^{\circ}8$; Jan. 28th, $12^{\circ}1$: Trent Col., alt., 120 ft.; Dec. 6th, -3° : Ringwood Hall, alt., 400 ft.; Dec. 7th, 0° : Belper, alt., 354 ft.; Dec. 7th, 4° : Hop-ton Hall, Jan. 19th, 28th, 29th, 5° : Ashbourne Hall, Dec. 7th, 9° .

Plants injured, 1879-80—67 (1), 63 (2), 36 (3), total at 7 places.

LEICESTERSHIRE. *Rainfall*, excessive, first 9 months, with temp. exceptionally low (Ashby Magna). Year cold and sunless (Dalby Hall, Coston, &c.). Min. rainfall, Market Harborough, ht., 17 ft. 2 ins.; 24·07 ins., on 151 days: max., Bruntingthorpe, alt., 400 ft.; ht., 1 ft.; 32·20 ins. Great failure in cereal and fruit crops (Belvoir Castle, Coston, &c.). *Min. temps.*, Coston., alt., 300 ft.; Dec. 2nd, $-4^{\circ}5$: Barkby, alt., 212 ft.; Dec. 2nd and 7th, 2° : Belvoir Castle, Dec. 2nd, 0° ; and 8th, 5° : Cottesbach, Dec. 6th, 0° : Loughborough, alt., 169 ft.; Dec. 2nd and 8th, $1^{\circ}5$: Leicester, alt., 237 ft.; Dec. 2nd, 3° ; Dec. 7th, $4^{\circ}3$; Jan. 29th, 17° : Birstall, alt., 250 ft.; Dec. 2nd to 7th, 10° .

Plants injured, 1879-80—80 (1), 96 (2), 61 (3), total at 7 places.

LINCOLNSHIRE. A cold, wet and sunless year (Bloxham, Grantham, &c.). *Rainfall*, though the summer was wet, cold and sunless, yet owing to dryness of early and later months, the total was below av. of 3 previous yrs. (Doddington). Min. rainfall, Crowle, alt., 10 ft.; 20·32 ins., on 154 days: max., Sleaford, alt., 20 ft.; ht., 1 ft.; 31·64 ins., on 161 days. Mean temp., 3° below yearly av., (Lowth): $8^{\circ}5$ below av. for Dec. (Boston). *Min. temps.*, Bloxholm, alt., 20 ft.; Dec. 7th, -6° : Appleby, alt., 50 ft.; Dec. 7th, $-4^{\circ}7$: Heming-

by, and Stoke Rochford; Dec. 7th, -5° : Boston, alt., 24 ft.: Bucknall, alt., 150 ft.: Horncastle, alt., 100 ft.; and Lincoln, alt., 25 ? ft.; Dec. 7th, 0° : Kelstern, alt., 388 ft.; Dec. 7th, $5^{\circ}\cdot 8$: Killingholme, alt., 60 ft.; Dec. 7th, $10^{\circ}\cdot 5$.

Plants injured, 1879-80—37 (1), 39 (2), 17 (3), total at 4 places.

NOTTINGHAMSHIRE. Year characterised by almost continuous low temp., and absence of sun, with a consequent lateness of vegetation. The first qr. was dry, the 2nd and 3rd qrs. wet. Mean temp. was $45^{\circ}\cdot 3$ or 3° below av. of previous 3 yrs. (Worksop). *Rainfall*, min., Retford, alt., 52 ft.; ht. 3 ft. 6 ins.; 22·94 ins., on 162 days: max., Nottingham, alt., 162 ft.; ht., 1 ft.; 31·68 ins., on 189 days. *Min. temps.*, Hodsock, alt., 55 ft.; Dec. 7th, $-5^{\circ}\cdot 8$: Osberton Hall, Dec. 7th, -5° : Highfield House (Nottingham), $-3^{\circ}\cdot 1$: Ollerton, alt., 175 ? ft.; and Nottingham, alt., 180 ft.; Dec. 8th, -2° : Coddington, alt., 120 ft.; Dec. 12th [7th ?] -1° : Mansfield, alt., 349 ft.; Dec. 7th, $3^{\circ}\cdot 7$; Jan. 20th, $17^{\circ}\cdot 7$.

Plants injured, 1879-80—34 (1), 36 (2), 14 (3), total at 2 places.

RUTLAND. Year, very dull; Oct., the finest month; temp. low from deficiency of sunshine (Ketton Hall). *Rainfall*, slightly below av. of 5 yrs. (Uppingham): min. rainfall, Ryhall, ht., 1 ft. 2 ins.; 25·20 ins., on 127 days: max., Market Overton, ht., 11 ins.; 29·04 ins., on 222 days. *Min. temps.*, Ketton Hall, alt., 130 ft.; Dec. 7th, -11° *: Burley, Dec. 2nd and 7th, 9° : Uppingham, alt., 484 ft.; Dec. 2nd, $15^{\circ}\cdot 5$.

Plants injured, 1879-80 — 22 (1), 16 (2), 5 (3), total at 2 places.

REPORTS.

1. **DERBYSHIRE**—ASHBOURNE, Ashbourne Hall.—Mrs. Frank.

Gen. Char. of Soil—A deep loam; subsoil, gravel.

Alt. and Exposure—500 ft.; S. and E.

Rainfall, 1879—[Cheadle, dist., 9 ms.; alt., 647 ft.; ht., 1 ft.; 36·83 ins., on 182 days].

* Mr. Symons observes on this temp. (*Month. Met. Mag.* Jan. 1880, p. 185) "There can be little doubt that it is entitled to the position [of heading the list of low temps.] but the therm. was not verified, and we do not know exactly how it was placed. Mr. Coventry writes as follows - 'The therm. was in an exposed position and observed by one of our gardeners to register - 11° , of the correctness of which I have no doubt. I have compared the therm. I observed in Dec. with Rutherford's and Phillips's, and I find both agree.'"

Date of Onset and Duration of Frost—Nov. 2nd, and lasted 98 days, viz., 14 in Nov., 27 in Dec., 23 in Jan., 14 in Feb., 14 in March, 4 in April, 1 in May, and 1 in June.

Min. Temps. and Dates—[Dec. 7th ?], 9°: [Belper, dist., 12 ms.; alt., 354 ft.; Dec. 7th, 4°: Hopton Hall, dist., 8 ms.; Jan. 29th, 5°].

Plants injured, 1879-80—14 (1), 10 (2), 4 (3)—*Ampelopsis hederacea*, 1. Apples, young grth. kd., 3. *Aucuba japonica*, (shooting from roots, Nov. 20, 1880) 2. *Berberis Darwinii*, 1. *Caluna vulgaris*, white, E. aspect, 1. *Cytisus albus*, 2. Elder, red-berried, 1. *Escallonia macrantha*, W. asp., 1. *Euonymus*, silver edged, W. asp., 2. Filberts, 3. Heather, white, or Ling, E. asp., 1. Holly, 2; Do., golden edged, 1. Ivy, common English, E. asp., 2; Do. palmated, of yrs. standing, in various asp., 1; Do., Irish, large-leaved, in E. asp., 1. *Jasminum officinale*, 2. Laurel, common, 2; Do., Portugal, 2. Lime, 3. Nectarines and Peaches, on S. and W. walls, 1. *Pinus Strobus* (Weymouth P.), exposed on E., 1. Plums, Golden drop and Washington, on W. wall, 2. *Roses*, Gloire de Dijon, fine plants, on S. E. wall, 20 ft., 1; Do., Pink China, 2.—*Tritoma uvaria*, sheltered, 1. Wallflowers, in all asp., except under S. wall, 1. Yew, 3.

Plants uninjured—Yew, neither the Golden-edged or Irish were touched in the most exposed places.

Observations—Hollies, some escaped injury alongside of others that were killed nearly to the ground. Those in the most sheltered places were injured the most. We have scarcely a Holly left out of dozens of fine plants 10 to 12 ft. high. Some were killed in to the main stem, others within a foot of the ground. The Golden-edged Holly killed was in a place sheltered from all cutting winds.

2. BELPER.—Mr. W. Moure.

Gen. Char. of Soil—Light, inclining to sand, rather poor but dry.

Alt. and Exposure—354 ft.; very bare and exposed to cold E. winds, but not much to frost.

Rainfall, 1875—35·83 ins.

Date of Onset and Duration of Frost—Oct. 16th to Feb. 1880.

Min. Temp. and Date—Dec. 7th, ht., 3½ ft., 4°.

Plants injured, 1879-80—3 (1), 1 (2)—Broccoli, of 1400 plants, 90 p. c., 1. Holly, 2. Laurel, Bay, 2. *Laurustinus*, 12 plants, 1.

Observations—With the exception of the above, we have escaped very well; not having lost a single Rose. In general (with few ex-

ceptions) round about this neighbourhood trees and shrubs have escaped wonderfully.

3. BORROWASH, Elvaston Castle.*—"T. B."

Gen. Char. of Soil—Moist.

Alt. and Exposure—[200 ? ft. : Trent Coll., dist., 4 ms. ; alt., 120 ft.] ; air, moist.

Rainfall, 1879—[Spondon, dist., 2 ms. ; alt., 262 ft. ; ht., 7 ins. ; 31·58 ins., on 191 days].

Min. Temp. and Date—[Dec. 7th ?] about -10° [too low ? Trent Coll., alt., 120 ft. ; dist., 4 ms. ; -3°].

Plants injured, 1879-80—7 (1), 7 (2), 7 (3)—*Abies Douglasii*, 3. *Araucaria imbricata*, 2, 3. *Cedrus Deodara*, lost leaves, 3 ; *C. Libani*, do., 3. Furze, single and fl. pl., kd. to grd, 2. Hollies, green, gold and silver vars., *Cunninghamii*, Queen, *maderensis*, Milkmaid, many 20 ft. high, many, 1, 2. *Juniperus chinensis*, female, 2 (male, unhurt). Laurel, Portugal, 50 yrs. old, and clipped hedges, all, 1. *Menziesias*, 1. Mulberry, 40 yrs. old, 1. *Picea Pinsapo*, 3. *Pinus Coulteri*, 2 ; *P. insignis*, 19 yrs., all, 1 ; *P. macrocarpa*, rather more than *P. Coulteri*, 2. *Sequoia gigantea*, one 8 ft. in girth, 1, 2, 3. Walnuts, 40 yrs. old, 1. Yew, 3.

4. BORROWASH, Manor House.—Mr. G. H. Wright.

Gen. Char. of Soil—A shallow brown loam, with gravel subsoil.

Rainfall, 1879—[Spondon, dist., $1\frac{1}{2}$ ms. ; alt., 262 ft. ; ht., 7 ins. ; 31·58 ins., on 191 days].

Min. Temps. and Dates—[Trent Coll., dist., 4 ms. ; alt., 120 ft. ; Dec. 6th, -3° : Belper, dist., 9 ms., N. ; alt., 354 ft. ; Dec. 7th, 4°].

Plants injured, 1879-80—17 (1), 17 (2), 9 (3)—*Abies Douglasii*, 3. *Arbutus Unedo*, 1. *Aucuba japonica*, 2. *Berberis Darwinii*, in damp situation, 1 ; elsewhere, 2. *Ceanothus azureus*, 1. *Cedrus atlantica*, in shade, 1 ; *C. Deodara*, 3. *Cistus ladaniferus*, 1. *Cotoneaster microphylla*, 3. *Cryptomeria elegans*, 2. *Cupressus Lawsoniana*, where shaded, 3 ; *C. L. alba spica*, 3 ; *C. macrocarpa*, 1. *Cytisus albus*, 1 ; *C. purpureus*, damp place, 2. *Daphne indica*, *rubra*, 2. *Euonymus japonicus*, *ovatus aureus*, on S. wall, 1. Furze, fl. pl., 1. *Garrya elliptica*, on E. wall, 2. Hollies, vars., especially where shaded, 3. *Jasminum nudiflorum*, in S. aspect, 1. Laurel, common, 1, 2, 3 ; Do., *colchica*, 1, 2, 3 ; *L. Portugal*, 1, 2 ; all

* From *The Gard. Chron.*, 1880, p. 748.

suffered most where shaded. *Ligustrum vulgare*, *sempervirens*, 2. *Lithospermum prostratum*, 2. *Magnolia grandiflora*, on W. wall, 2. Pampas grass, 1. *Picea Lowiana*, 2; *P. Pinsapo*, exposed, 1; sheltered, 3. *Pinus insignis*, 1. *Retinospora lycopodioides*, in wet situation, 1. Roses, on Manetti and Standards, 2. *Sequoia gigantea*, 2. *Thymus citriodorus aureus*, on rockwork, 2. *Veronica salicifolia*, 1.

Observations — Fruit (1880), Apricots bore half-crops only; Apples on Pyramids, good; Currants, Black, poor; but Red and White, good; Gooseberries, good; Peaches, none; Plums, good on some trees; others bore half-crops only; Raspberries and Strawberries, good.

5. CHESTERFIELD, Ringwood Hall.—Mr. H. Smale.

Gen. Char. of Soil—Heavy loam, with clay subsoil.

Alt. and Exposure—400 ft., very exposed to cold cutting winds.

Rainfall, 1879—Year, very rainy, 27·53 ins.

Date of Onset and Duration of Frost—Sept. 30th to May 7th.

Min. Temp. and Date — Dec. 7th, 0°: [Hodsock, dist., 12 ms., N.E.; -5°·8].

Plants injured, 1879-80—16 (1), 5 (2), 1 (3)—*Araucaria imbricata*, 2. *Arbutus*, all, 1. *Aucuba*, 2. Broccoli, 1. Cauliflowers, 1. *Cedrus Deodara*, 1, 2. *Euonymus*, all, 1. Fennel, 1. Holly, gold and silver, 3. *Hydrangea*, 1. Ivy, variegated, where exposed to N., 1. Laurel, Bay, all, 1. Laurel, common, young growth killed where exposed to wind, 2. *Laurustinus*, 1. Lavander, 1. Pampas grass, 1. Parsley, 1. *Quercus Ilex*, 2. Roses, many, 1. Sage, 2. *Sequoia gigantea*, 1. *Tritoma*, 1.

6. CROMFORD, Willersley.—Mr. J. Tissington.

Gen. Char. of Soil—Clayey.

Alt. and Exposure—440 ft.

Rainfall, 1879 — 38 ins.

Min. Temps. and Dates—Dec. 25th [Dec. 7th ?], 2°: [Belper, dist., 7 ms., S.E.; Dec. 7th, 4°: Trent Col., dist., 19 ms., S.E.; Dec. 7th, -3°].

Plants injured, 1879-80 — 2 (1), 5 (2), 2 (3)—*Clematis Jackmanni*, kd. to grd., 2. Daisies, 1. Hollies, thickly planted, 3. Laurel, Bay, kd. to grd., 2. Laurel, common, 2. *Lonicera japonica*, kd. to grd., 2. Roses, Stands, on briars, 1, 2; on Manettis, 3.

Observations — Hollies, where planted thickly, lost many shoots; but those standing in the open were not injured. Roses, ours were

not destroyed to the extent that some situated at a lower level were. Vegetables, these did not grow to half their usual size in consequence of the cold and wet summer.

7. WIRKSWORTH, Hopton Hall.—Mr. G. Bolas.

Gen. Char. of Soil—Calcareous, being entirely on limestone.

Alt. and Exposure—[Holloway, dist., 4 ms.; alt., 500 ft.]. Well sheltered from N. E. and N. W. by hills and trees. Westerly hurricanes are broken in the distance by a grove of Beech trees.

Rainfall, 1879 — [Holloway, ht., 1 ft. 1 in.; 38·97 ins., on 178 days]. There were 113 wet days, including 17 heavy rains.

Date of Onset and Duration of Frost—Nov. 11th, to March 20th.

Min. Temps. and Dates—[Belper, dist., 7 ms., S.E.; alt., 344 ft.; Dec. 7th, 4°]: Jan. 19th, 28th and 29th, 5°: [Buxton, dist., 17 ms., N.W.; alt., 990 ft.; Dec. 7th, -3°·8; Jan. 28th, 12°·1].

Plants injured, 1879-80 — 8 (1), 18 (2), 13 (3) — *Ampelopsis* *bipinnata*, on wall, 2. *Apricots*, 5 large trees on S. E. wall, 1. *Artichoke*, globe, 2. *Arundo conspicua*, 3. *Asparagus*, 2. *Aucuba*, vars., 3. *Broccolis*, *Coolings* [?] matchless, 3; *Leamington*, 3; *Sutton's late Queen*, 3; *Veitch's self-protecting*, 2.—*Buddlea globosa*, 1. *Ceanothus americanus*, on wall, 2; *C. dentatus*, on wall, 2. *Cerasiums*, 2. *Chimonanthus fragrans*, on wall, 3. *Cistus*, gum, 1. *Escallonia macrantha*, on wall, 3. *Euonymus*, vars., on wall, 2. *Fraxinella*, 2. *Garrya elliptica*, 2. *Laurel*, Bay, 3. *Lavander*, old plants, 2. *Leycesteria formosa*, 3. *Ligustrum japonicum*, 3. *Lilium candidum*, 1. *Magnolia grandiflora*, on wall, 3. *Marrubium vulgare*, (*Horehound*), 1. *Mentha Pulegium* (*Penny-royal*), 2. *Pampas* grass, 2. *Passiflora cœrulea*, on wall, 1. *Pernettya*, vars., 3. *Polemonium cœruleum*, varieg., 2. *Rosemary*, 2. *Roses*, Dwfs., 6 p. c., 3; *Stand.*, 5 p. c., 1; 3 p. c., 3. *Rue*, 1. *Sequoia gigantea*, 3. *Schizostylis coccinea*, 2. *Spartium junceum*, 3. *Taxodium sempervirens*, 3. *Tritoma uvaria*, 2. *Viburnum Awafurki*, 3. *Vine*, purple-leaved, on wall, 2. *Yucca filamentosa*, 2.

Plants uninjured — *Cherries*, *Conifers*, e.g. *Balm of Gilead* (*Picea balsamea*), 3 yrs. old, made extraordinary growth in exposed situations, *Larches*, *Spruces*.—*Plums*, *Roses* (*climbing devoniensis*).

Observations — *Ampelopsis*, various sorts have done badly and made short growth. *Veitch's* was cut down by early frost which shrivelled up the foliage in a day. *Apricots*, wet oozed out of the mortar encrusting the branches. *Arundo conspicua*, has made good

growth, but not flowered. Cherries, on walls bore first-rate crops with no protection, though failures elsewhere around. Chimonanthus and Clematis, on wall, have failed to flower. Euonymus, though kd. to grd., has made fine growth. Pears, on walls, and pyramids, did nothing. Plums, on walls, gave first-rate crops, no protection. Tritomas, not fld. Tropæolum speciosum, fld. profusely and made fine growth in all situations but best on S. wall. Roses, escaped better than any yet observed; they were covered with snow till the thaw. They were then for some time 6 ins. in water, but uninjured; Climbing Roses (esp. devoniensis) on S. wall, made extraordinary growth, were not in the least injured and fld. well. Vegetables, all kinds have run very much the last 2 years, esp. early Celery. Kales produced all sorts of forms. Yuccas, weak in growth. (Dec. 6th, 1880).

1. LEICESTERSHIRE—ASHBY-DE-LA-ZOUCH, Staunton Harold.—Mr. J. Macaulay.

Gen. Char. of Soil—A loamy clay.

Alt. and Exposure—250 to 300 ft.; S. E.

Rainfall, 1879 — [Burton-on-Trent, dist., 7 ms.; alt., 160 ft.; ht., 1 ft.; 28·96 ins., on 208 days].

Min. Temps. and Dates—Dec. 24th, [7th ?] 0°: [Trent College, dist., 9 ms.; alt., 120 ft.; Dec. 6th, -3°: Burton-on-Trent, alt., 160 ft.; Dec. 7th, 5°: Loughborough, dist., 10 ms.; alt., 169 ft.; Dec. 2nd and 7th, 1°·5].

Plants injured, 1879-80 — 11 (1), 12 (2), 2 (3) — Apples, 2. Apricots, 2. Asparagus, in very wet soil, 2. Aucuba japonica, 2. Broccoli, 1. Cabbage, autumn planted, 1. Cedrus Deodara, in damp place, 1. Celery, 1. Escallonia macrantha, 1. Euonymus japonicus, aureus, 1, 2; E. j. marginatus, 1; E. j. latifolius albus, 3. Laurel, Bay, 2. Laurel, common, 1, 2; Do. Portugal, 2. Laurus-tinus, 1. Pampas grass, 1. Quercus Ilex, one nearly kd., 2; Q. austriaca sempervirens, 2. Roses, 1, 2, 3. Walnut, 2.

2. BOTTESFORD, Belvoir Castle.—Mr. W. Ingram.

Gen. Char. of Soil — Middle Lias, or Marl stone, resulting in a ferruginous soil. Lower Lias clay, modified and often mixed with the above calcareous soil.

Alt. and Exposure—From 200 to 400 ft.; pleasure ground being 350 to 400 ft.; kitchen garden, 237 ft.; generally sheltered by tall timber trees and extensive woods.

Rainfall, 1879—26·90 ins. ; average of 10 years, 24·50 ins. ; for last 5 years, 28·44 ins.

Date of Onset and Duration of Frost—Nov. 13th to Jan. 30th.

Min. Temps. and Dates—Dec. 2nd, ht. 4 ft., 0°; 3rd, 9°; 4th, 10°; 5th and 6th, 9°; 7th, 1°; 8th, 5°: on the grass, Dec. 2nd, -0°·5; Dec. 7th, 0°·4 [Coston, dist., 8 ms., S.; alt., 300 ft.; Dec. 2nd, -4°·5].

Plants injured, 1879-80 — 14 (1), 16 (2), 13 (3) — *Araucaria imbricata*, in low grd., near water, 1. *Arundo conspicua*, 1. Artichoke, globe, many 1, 2. *Asparagus*, 2. *Aucuba*, many kd. to grd., 2. *Azara microphylla*, 3. *Bambusa Metake*, 3. *Berberis Darwinii*, 3. Broccoli, 1, 2. *Cedrus Deodara*, 2, 3; *C. Libani*, on sheltered spots, 3. *Cercis siliquastrum*, 2. *Cistus ladaniferus*, 1. *Eryngium pandanifolium*, 1. *Escallonia macrantha*, 2. *Euonymus japonicus*, *ovatus*, *aureus*, &c., 1; *E. radicans varieg.*, 1. Fig, 2. Holly, 3. Kale, hardy, 2. Laurel, Bay, in damp places, 2. Laurel, common, 3. *Laurustinus*, on dry bank, exposed to S., 3. Lavander, 1. *Lithospermum prostratum*, 3. *Lonicera fragrantissima*, 2. *Magnolia grandiflora*, lost many leaves, 3; (is shooting vigorously; was more injured in 1860). *Ophiopogon spiculosum*, 3. Pampas grass, 1, 2. *Penstemon*, vars., 1. *Phormium tenax*, 1. Rosemary, 1. Roses on briars, about 80 p. c., 1; others, 2. *Sequoia gigantea*, 3. *Sparaxis pulcherrima*, 2. Strawberries, 3; *Hericault de Thury*, most injured (showing that French sorts are less hardy). Thyme, 3. *Tritoma uvaria*, 2. Yew, in damp places, 2.

Plants uninjured—*Araucaria imbricata*, on elevated ground; *Aucubas* and *Azara microphylla*, scarcely injured on dry banks; *Cedrus Deodara*, where elevated; Bay Laurels, quite hardy on unsheltered ground; Pampas grass was not destroyed on dry banks; Yew, in dry places.

3. LEICESTER, Barkby Hall.—Mr. J. Lansdell.

Gen. Char. of Soil—Light here, but in the immediate neighbourhood, a heavy clay soil.

Alt. and Exposure—[212 ft.] Open on W., but protected on N. E. and S., by trees.

Rainfall, 1879—[Ht., 1 in.; 26·46 ins., on 186 days].

Date of Onset and Duration of Frost—Nov. 13th to 17th; 20th to Dec. 14th; 17th to 28th (temp. from 30° to 20°); Jan. 13th to 31st; Feb. 9th to 14th.

Min. Temps. and Dates—Dec. 2nd, 0°; Dec. 7th, 2°: [Birstal, dist., 3 ms.; alt., 250 ft.; Dec. 7th, 10°: Leicester, dist., 4 ms.; alt., 237 ft.; Dec. 2nd, 3°; 7th, 4°·3; Jan. 20th, 18°6; 29th, 17°].

Plants injured, 1879-80 — 12 (1), 9 (2), 4 (3)—Aucubas, 1, 2. Clematis montana, trained on arches, 1. Hollies, many, 2, 3. Honey-suckle, trd. to arches, 1, 2, 3. Laurel, Bay, cut to grd., 2. Laurel, common, cut to grd., 2; Do. Portugal, many 20 ft. high, 20 to 27 ft. diam., 1, 2, 3. Lavander, large old plants, many, 1, 2. Rosemary, old plant, 1. *Roses*—Belle Lyonnaise (climber), 1, 2; Briars for budding, 65 p. c., 1; 45 p. c., kd. to grd., 2; Celine Forestière, 1, 2. Cheshunt Hyb. (climber), 1, 2; Dwfs., all wrapped up in long stable litter (25) 1, (9) 2, (955) 3; Gloire de Dijon, (10) 1, (5) 2; Maréchal Niel (29) 1, 2 (see below); Niphetos (climbers), 1, 2; Reve d'Or, (5) from 10 to 15 ft. high, 1; Standards, (420) 1, (113) 2, (320) 3. Sages, nearly all, 1. Thyme, a large bed of old plants, nearly all, 1. Wallflowers, 1.

Observations—Hollies, 78 had to be cut down; most of them have broken out again nicely. Roses, Maréchal Niel, 29 killed, nearly all on walls; they were all covered with straw and a thick mulching of long manure. Those not killed were cut to grd., but have since grown well (Jan. 7th, 1881).

4. LEICESTER, Birstal Hill.—F. T. Mott, Esq., F.R.G.S.

Gen. Char. of Soil—Good, a rather stiff loam; subsoil, Boulder drift-clay with pockets of sand.

Alt. and Exposure—About 250 ft. Surface nearly flat, being a table-land about 70 ft. above the river valley, with a very slight slope to N. E. The garden is partially protected on N. by the house and some tall Elm trees.

Rainfall, 1879—Average yearly Rainfall is about 28 inches: [Leicester, Mus., alt., 238 ft.; ht., 1 ft.; 27·65 ins., on 210 days].

Date of Onset and Duration of Frost—Began Nov. 13th; about 22°; then snow, frost and thaw alternately, till Dec. 1st; when a frost with temp. below 20° set in for a week. Then, snow, frost and thaw, again, alternately, till Jan. 18th, 1880, when there was another fortnight of hard frost, followed by 6 weeks of dull raw weather.

Min. Temp. and Date — Dec. 2nd to 7th, every morning at 8·30 a.m., 10° [See (3) Barkby, dist., 3 ms.; Leicester, dist., 2 ms.].

Plants injured, 1879-80 — 3 (1), 11 (2), 13 (3) — Ampelopsis Veitchii, 3. Aucuba, 2. Berberis Darwinii, 2; B. dulcis, 3. Biota

orientalis, aurea, 3. *Castanea vesca*, 3. *Cistus ladaniferus*, 3. *Cotoneaster Simonsii*, 2. *Cupressus Lawsoniana*, 3. *Cytisus*, white and yellow Broom, 2. Furze, fl. pl., 1. Gooseberries, 3. Holly, 2. Ivy, 2. Laurel, common, 2; Do. var. *caucasica*, 3; Do. Portugal, 3. *Laurustinus*, 1, 2. *Leycesteria formosa*, 2. *Ligustrum vulgare*, 3. Mulberry, young tree, 1. Roses, 2. *Spartium junceum*, 2. *Spiræa*, several shrubby species, 3. *Ulmus stricta* (?), 3. Yew, many outer shoots, browned, 3.

Plants uninjured—*Andromeda floribunda*, Apples, hardy Azaleas, Cherries, Currants, *Cytisus Laburnum*, *Kalmia latifolia*, *Liriodendron tulipifera*, Pears, Plums, Raspberries, Rhododendrons (white and lilac), and Walnuts.

Observations—Spanish Broom (*Spartium junceum*), Tree Ivy, Common Laurel, some plants of *Laurustinus*, and *Leycesteria formosa*, though killed to the ground, have shot up again (Oct. 17, 1880).

5. LOUGHBOROUGH.—Mr. W. Tillerton.

Gen. Char. of Soil—Sandy, a sandy gravel, medium, and clay.

Alt. and Exposure—[Victoria Street, 169 ft.]; N. winds prevailed through most of the winter.

Rainfall, 1879—[Victoria St., ht., 10 ins.; 26·15 ins. on 184 days].

Min. Temp. and Date—[Dec. 2nd and 8th, 1°·5].

Plants injured, 1879-80—25 (1), 37 (2), 26 (3)—*Antirrhinum*, 1, 2. Apples, late sorts, 3. *Araucaria imbricata*, 2, 3. *Arbutus*, 1, 2. Artichoke, globe, 1, 2. *Aucuba*, 1, 2. *Berberis* sp., 1, 2, 3. Blackberry, 1, 2, 3. Broccoli, 1, 2. Brussels sprouts, 2, 3. Cabbages, 1, 2, 3. Carnations, 2, 3. Cauliflower, 1. *Cedrus Deodara*, 1, 2, 3. *Cineraria acanthifolia*, 1, 2. *Cryptomeria japonica*, 2, 3. Furze, 1, 2. *Helianthus*, hardy, 1, 2. *Helleborus*, 3. Hollies, 1 (mostly on side), 2, 3. Ivy, sorts, 2, 3. *Jasminum*, 2, 3. Kale, curled, 1, 2. Larch, 3. Laurel, Bay, 1, 2. Laurel, common, 2, 3; Do. Portugal, 3. *Laurustinus*, 1, 2. Lavender, 1, 2, 3. Nectarines, 2, 3. Peaches, 2, 3. *Phillyrea*, 2. Privet, 1, 2. *Quercus Ilex*, 2, 3. Rosemary, 1, 2, 3. Roses, 1, 2. Rue, 1, 2, 3. Sage, 1, 2. Stocks, Brompton, 1, 2, 3. Thyme, 1, 2. Vines, 3. Wallflowers, 1, 2. Walnuts, 2, 3.

Observations—Apples, late growth not having ripened, accounts for their injury. Common Laurels, a whole hedge 40 or 50 yds. long had to be cut to the ground; and much larger ones on clay land. The winter's effects have been especially noticeable this

spring, where the soil is wetter. Some trees have suffered very much while others of the same kind have been scarcely at all injured only a few yards distant; as water is much nearer to surface in some places than others.

6. LUTTERWORTH, Cotesbach Hall.—Mr. E. Hunstone.

Gen. Char. of Soil—Strong; subsoil varying between sand and clay.

Alt. and Exposure—[Rugby, dist., 4 ms.; alt., 383 ft.]. Flat and open.

Rainfall, 1879—[Rugby, 29·11 ins., on 188 days].

Min. Temp. and Date—Dec. 6th, 0° [Rugby, dist., 4 ms.; 3°·2].

Plants injured, 1879-80—9 (1), 8 (2), 1 (3)—*Araucaria imbricata*, many 1, 2. *Artichoke*, globe, 1. *Aucuba japonica*, 1, 2. *Berberis Darwinii*, 2; *B. stenophylla*, 2. *Broccoli*, all sorts, 1. *Brussels sprouts*, 3. *Cabbages*, Savoy, 2. *Holly*, 2. *Laurel*, Bay, 1. *Laurel*, common, kd. to grd., shooting from stump, 2; *L. Portugal*, 2. *Laurustinus*, 1. *Mahonia Fortunei*, 1; *M. japonica*, 1. *Quercus Ilex*, 2.

Observation—Every vegetable and herb in the kitchen garden was injured more or less.

7. MELTON MOWBRAY, Coston.—Rev. A. M. Rendell.

Gen. Char. of Soil—A cold clay (Lias).

Alt. and Exposure—About 300 ft.; somewhat exposed in every direction; but least, to N.E. The ground slopes from N.E. to S.W.

Rainfall, 1879—Ht., 1 ft.; 29·37 ins., on 207 days.

Date of Onset and Duration of Frost—Nov. 13th to Dec. 27th; with a few days, temp. above 32°; Jan. 3rd to Feb. 2nd, 1880.

Min. Temps. and Dates—Dec. 2nd, -4°·5: [Belvoir Castle, dist., 8 ms., N.; alt., 237 ft.; Dec. 2nd, 0°].

Plants injured, 1879-80 — 8 (1), 2 (2), 2 (3)—*Cabbages*, 1. *Cedrus Deodara*, 1. *Cratægus Pyracantha*, 1. *Garrya elliptica*, 1. *Holly*, one plant only, 1. *Laurel*, common, 1, 2; *L. Portugal*, 1, 2. *Yew*, common, 3; *Irish*, 1, 3.

Plants uninjured—Hollies.

Observations—The trees and shrubs greatly injured, (2) were kd. to grd., but have since sprouted.

1. LINCOLNSHIRE — GAINSBOROUGH, Gate Burton. — Mr. S. Stephenson.

Gen. Char. of Soil—Various, but principally a strong clay.

Alt. and Exposure—96 ft.; exposed to E. and W. winds.

Rainfall, 1879—Ht., 3 ft. 6 ins.; 24.16 ins., on 164 days.

Date of Onset and Duration of Frost—[Frost very severe first wk. of Dec. and end of Jan., in Lincolnshire].

Min. Temps. and Dates—[Lincoln, dist., 10 ms., S. E.; alt., 25 ft.; Dec. 2nd, 5°; 3rd, 9°; 4th and 5th, 7°; 6th, 9°; 7th, 0°: Osberton, dist., 12 ms., W.; Dec. 7th, -5°: Kelstern, dist., 22 ms., E.; alt., 388 ft.; Dec. 7th, 5°·8; Jan. 29th, 16°·9].

Plants injured, 1879-80—4 (1), 7 (2), 5 (3)—Apples, 2. Apricots, 3. Asparagus, 2. Box, 3. Broccoli, 1. Cabbages, Savoy &c., 1. Cauliflower, 1. Holly, 3; Do. variegated, 2. Ivy, 2. Laurel, common, 2; Do. Portugal, 2. Oaks, 3. Peaches, 2. Roses, Stands, 1. Sequoia gigantea, 3.

2. GRIMSBY.—Mr. J. M. Lundie.

Gen. Char. of Soil—Very heavy and clayey, but in a few places light and loamy.

Alt. and Exposure—100 ft., rising to 300 ft., in the wolds, 9 ms. dist. from the coast. Bleak and exposed to cutting E. winds.

Rainfall, 1879—18.5 ins. [Aylesby, dist., 4 ms., W.; ht., 2 ft.; 27.22 ins., on 199 days].

Date of Onset and Duration of Frost—From end of Nov. lasting, with intervals, for two months. [Dec. was cold and dry till close, when it became mild and moist].

Min. Temps. and Dates—[Dec. 7th ?] 8°: [Kelstern, dist., 8 ms. ?, S.; alt., 388 ft.; Dec. 7th, 5°·8; Jan. 29th, 16°·9: Killingholme, dist., 8 ms., N.; alt., 60 ft.; Dec. 7th, 10°·5; Jan. 29th, 21°].

Plants injured, 1879-80—15 (1), 5 (2), 5 (3)—*Bulbous* plants, rotted through, by wet of 1879; Crocus, 10 p. c., 1; Hyacinths, 20 p. c., 1; Lilies, Narcissi and Snowdrops, 5 p. c., 1; Tulips, 30 p. c., 1; and 5 p. c., 3. *Cereals*, Barley, Wheat, Oats and field crops, 40 p. c., 1; in some cases had to be resown on account of the wet and frost. *Flowers*—These did not suffer much from frost, but blossomed poorly on account of the wet. *Fruit trees*—Apples, Currants, Gooseberries, Pears and Plums did poorly from wet; also damaged by hail and frost in the spring during blossoming, 5 p. c., 3. *Forest trees*—Alder, Ash, Beech, Birch, Chestnut, Elm, Fur, Hazel, Oak, Plane, Sycamore, Willow, Yew, did not on the whole suffer, but a few young saplings were killed. *Roses*, of common, fancy and variegated sorts, 60 p. c., 1; 10 p. c., 2; suf-

fered more than any thing from the severe hail-storms and frost in the spring. *Shrubs*—Laurel, common, 30 plants, 1; Laurustinus, 1, 2; Sequoia gigantea, 3; Thujas, 3. *Vegetables*—Cabbages &c., 15 p. c., were nipped by the frost.

3. HORNCASTLE, Hemingby.—Mr. E. S. Bengough.

Gen. Char. of Soil—A sandy loam and gravel; subsoil, mostly a white clay.

Alt. and Exposure—In a shallow valley of the wolds, running N. N. W. and S. S. E.

Rainfall, 1879 — [Horncastle, dist., 3 ms., Queen Street; alt., 100 ft.; ht., 1 ft.; 31·01 ins.].

Date of Onset and Duration of Frost—Nov. 22nd to Dec. 28th; Jan. 19th to Feb. 5th.

Min. Temps. and Dates—Dec. 7th, -0°·5 [Bucknall, dist., 6 ms., S.E.; alt., 150 ft.; Dec. 7th, 0°: Bloxholm, dist., 16 ms., S.W.; alt., 20 ft.; Dec. 7th, -6°].

Plants injured, 1879-80—4 (1), 6 (2), 2 (3)—Amaryllis Belladonna, no flrs., 1880, 3. Aucuba japonica, 2. Broccoli, 2. Cauliflower, 2, 3. Laurel, common, some planted in Aug., 1; others, 2; Do. Portugal, 2. Lonicera sempervirens, kd. to grd., 2. Pampas grass, newly planted, 1. Roses, Gloire de Dijon, old, 1 in. diam., over a trellis, 1. Yew, one closely clipped, 1.

Observations — Portugal Laurel, did not show signs of injury but the foliage began to fall in the spring; and most of them had to be cut down to the ground.

4. SLEAFORD, Bloxholm.—Mr. D. Lumsden.

Gen. Char. of Soil—Calcareous.

Alt. and Exposure—20 ft.; not exposed, but suffer much from late spring frost.

Rainfall, 1879—Ht., 1 ft.; 31·64 ins., on 161 days.

Date of Onset and Duration of Frost—Nov. 21st, continuing to Dec. 28th.

Min. Temp. and Date — Dec. 2nd, -3°; 7th, 6°. Never below zero, since the winter, 1860-61.

Plants injured, 1879-80—14 (1), 21 (2), 5 (3)—Abies Morinda, 2. Apples, 2. Araucaria imbricata, fine trees, 1. Arbutus Unedo, 1. Aucuba japonica, male and female, kd. to grd., but starting again, 2. Arundo conspicua, 2. Box, 3. Broom, 3. Cedrus Deodara, 2. Coto-neaster microphylla, 2. Cryptomeria japonica, 3. Euonymus japo-

nicus, variegated, 1. *Garrya elliptica*, 1. Holly, common, 2; Do., variegated, 1. Ivy, 2. Laurel, Bay, kd. to grd., 2. Laurel, common, 40 ft. by 20 ft., 1, 2; Do. Portugal, 1, 2. *Laurustinus*, 1, 2. Lavander, 1. *Ligustrum vulgare*, 2; *L. v. ovalifolium*, 1. *Lonicera brachypoda*, *aureo-reticulata*, 1. *Magnolia*, 1. Pampas grass, 2. Pears, 2. *Phillyrea angustifolia*, 2; *P. latifolia*, 2. Plums, 2. *Quercus Ilex*, fine trees, 100 yrs., 50 ft., 1; *Q. Suber*, 2. *Taxodium sempervirens*, 3. Walnut, no fruit, 1880, 2. Yew, 40 ft., 1, 2, 3.

Observations — Fruit trees, bore very little fruit. Hollies, the destruction amongst these and other trees and shrubs was greatest where they were most sheltered and the ground moist; of the common Green Hollies, those laden with berries were killed but those without berries did not seem to be quite destroyed though very much injured; the variegated specimens killed were 40 ft. high.

1. NOTTINGHAMSHIRE — NEWARK, Coddington Hall. — Mr. W. Maher.

Gen. Char. of Soil — Variable, from a light sandy loam to stiff clay with a gravelly subsoil.

Alt. and Exposure — About 120 ft.; on the top of a hill exposed to N.E.

Rainfall, 1879 — [Oxton, dist., 12 ms., W.; ht., 9 ins.; 31·10 ins.].

Min. Temps. and Dates — Dec. 12th [7th ?] -1° [Highfield, Nottingham, dist., 18 ms., S.W.; Dec. 7th. ht., 4 ft.; -2°·3; on snow, -5°·3: Ollerton, dist., 13 ms., N.W.; alt., 175 ft. ?; Dec. 7th, -2°].

Plants injured, 1879-80 — 5 (1), 6 (2), 1 (3) — *Araucaria imbricata*, 1. *Berberis Darwinii*, 1. *Broccolis* — Adam's early White, Cattell's Eclipse, Knight's Protecting, Leamington, all, 1. Figs, 2. Holly, 2. Laurel, Bay, kd. to grd., 2. Laurel, common, kd. to grd., 2; Do. Portugal, kd. to grd., 2. *Laurustinus*, 1. Roses, Stands, most of them, 1, 2. Yew, 3.

Observations — The Laurels, Bay, common and Portugal, are springing again from the ground.

2. WORKSOP, Hodsock Priory. — H. Mellish, Esq.

Gen. Char. of Soil — Red Sandstone.

Alt. and Exposure — 53 ft.; the garden is a good deal surrounded by wood. It has two small ponds and various streams in and around it.

Rainfall, 1879—Ht., 1 ft. ; 26·28 ins., on 197 days.

Date of Onset and Duration of Frost—Frost was most severe from Dec. 1st to 18th, and the temp. was 20 times below 20° in Dec. The mean daily max. was 38°·9 : the mean min., 22°·8. The second period was from Jan. 14th to 31st.

Min. Temps. and Dates—Dec. 7th, -5°·8. Jan. 21st, 1°·6 ; on grass, 16th, -4°.

Plants injured, 1879-80—29 (1), 30 (2), 13 (3)—*Aloysia citriodora*, 1. *Ampelopsis Veitchii*, 1. Apricots, 1. *Araucaria imbricata*, 3. *Arbutus*, 1, 2. *Aristolochia Siphon*, 2. Artichoke, globe, 2. *Asparagus*, 1. *Aucuba japonica*, 1, 2. *Berberis Darwinii*, 1, 2 ; *B. stenophylla*, 2. Box, 3. Broccoli, 1. Brussels sprouts, 2. Cabbages, 3. Carnations, 1. *Catalpa syringæfolia*, 2. Cauliflowers, 1. *Cedrus Deodara*, 1. *Cotoneaster microphylla*, 3. *Cryptomeria japonica*, 3. *Cupressus Lawsoniana*, 1 ; *C. macrocarpa*, 1. *Daphne Cneorum*, 1. *Escallonia macrantha*, 1. *Euonymus*, 2. Figs, 2. Furze, 2 ; and fl. pl., 1. Holly, 2. *Hydrangeas*, 2. *Hypericum calycinum*, 2. Ivy, large plants in some places, 1. *Jasminum officinale*, 3 ; *J.* large white flowered, 1. Kale, 1. Laurel, Bay, 2. Laurel, common, kd. to grd., revived, 2 ; *Do. var. caucasica*, 2 ; *Do. Portugal*, 1. *Laurustinus*, 2. *Ligustrum japonicum*, 1. *Lonicera fragrantissima*, 2 ; *L. japonica*, 2. *Magnolia grandiflora*, 2. Mulberry, standard, 3. Myrtle, 1. Nectarines, 3. Oaks, 3. *Pæonia Moutan*, 2. Pampas grass, 2. Parsley, 2. Peaches, 3. *Picea Pinsapo*, 3. *Quercus Ilex*, kd. to grd., 2. Quince, 1. Rosemary, 1. *Roses*, climbing and dwfs., on Manetti, (protected with bracken and yew boughs) very few 1 ; both H.P.'s and Teas being kd. to grd., 2 ; Stands., 1 ; a very fine *devoniensis* and two large *Reve d'Or* budded above grd., and 1 or 2 *Gloire de Dijon*, 1. *Salisburia*, 2. *Santolina incana*, 1. *Sequoia gigantea*, 1, 2. Tamarix, 2. Wallflowers, 1. Walnut, 3. *Weigela alba*, 2. *Wistaria sinensis*, 3. Yew, 2.

Plants uninjured—*Abies Douglasii*, *Acacia* (pink), *Acer Negundo* variegata, Almond, *Cedrus Deodara* (young plants protected by snow), Cornus (silver variegated), *Cryptomeria elegans*, Irish Ivy (in some places), *Liriodendron*, Mulberry against a wall, *Picea nobilis*, *P. Nordmanniana*, *Pinus Cembra*, *Retinospora*, *Sequoia gigantea* (old tree), *Skimmia japonica*, *Thuja aurea*, *T. gigantea*, *Thujopsis borealis*.

1. RUTLAND—OAKHAM, Burley-on-the-Hill.—Mr. W. Temple.

Gen. Char. of Soil—Strong and retentive.

Alt. and Exposure—High, on the side of a hill.

Rainfall, 1879—Ht., 1 ft.; 28·46 ins., on 160 days.

Date of Onset and Duration of Frost — Oct. 15th to June 5th, 1880; 112 days below freezing point.

Min. Temps. and Dates—Dec. 2nd and 7th, 9° [Coston, dist., 6 ms., N.W.; alt., 300 ft.; Dec. 2nd, -4°·5: Ketton, dist., 7 ms., S.E.; alt., 130 ft.; Dec. 7th, -11°·0: Uppingham, dist., 6 ms., S.; alt., 484 ft.; Dec. 2nd, 15°·5].

Plants injured, 1879-80 — 1 (1), 4 (3)—*Aucuba japonica*, parts of shoots kd., 3. Broccoli, 1. “Hardy greens,” 3. *Magnolia*, 3. Roses, pts. of shoots kd., 3.

2. STAMFORD, Ketton Hall—Fred. Coventry, Esq.

Gen. Char. of Soil—A clayey loam on limestone.

Alt. and Exposure — 130 ft.; in a valley running E. and W.; west of rivers Chater and Welland.

Rainfall, 1879—Ht., 1 ft.; 25·92 ins., on 170 days.

Min. Temp. and Date—Dec. 6th, -11° [See Meteor. Obs., p. 76].

Plants injured, 1879-80—21 (1), 16 (2), 1 (3)—*Aloysia citriodora*, 1. Apricots, 2. *Arbutus Andrachne*, 1; *A. Unedo*, 1. Artichoke, globe, 1. *Aucuba japonica*, 1; *Do. variegata*, 1. *Berberis Darwinii*, 1. Borecole, 1. Broccoli, all, 1. Brussels sprouts, all, 1. Cabbages, all, 1. *Cedrus Deodara*, 1; *C. Libani*, 2. Celery, 2. *Cistus*, gum, 1. *Cotoneaster microphylla*, 2; *C. Simonsii*, 2. *Cratægus Pyracantha*, 3. *Cupressus macrocarpa*, 1. *Escallonia Ingrami*, 2; *E. macrantha*, 2. *Euonymus japonicus*, 2. Figs, on wall, kd. to grd., 2. *Garrya elliptica*, 2. Holly, 2; *Do. variegated*, 2. Ivy, 2; Ditto variegated, 2. *Kalmia latifolia*, 2. Laurel, Bay, 1. Laurel, common, 1; *L. Portugal*, 1. *Leycesteria formosa*, 1. Pampas grass, 1. Parsley, 2. Poplars, Lombardy, 1. *Roses*, dwfs., on Manetti, 1; *H. P.’s*, on own roots, kd. to grd., 2; Stands on dog, 1. Tea, 1; &c. on wall, 2. *Sequoia gigantea*, 2.

Observations—*Sequoia gigantea*, fine trees, in a very uncertain state for a long time, have recovered; small trees have been killed entirely.

DIVISION VIII.—N. W. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM CHESHIRE
AND LANCASHIRE.

CHESHIRE. A cold sunless year (Bostock, Cholmondeley, Hinderton, &c.). *Rainfall*, near av.; last 3 months being very dry (Pulford, Astle Hall, &c.); 14·6 p. c. above av. of 17 yrs., (Neston). Min. rainfall, Chester (shot tower), alt., 227 ft.; ht., 160 ft.; 17·60 ins., on 139 days: max., Woodhead Res., alt., 680 ft.; ht., 10 ins.; 46·62 ins., on 212 days. Fruit and veg. crops a month later than usual (Cholmondeley). Green crops deficient in quant. and qual. (Pulford). *Temps.*, E. Cheshire, mean temp. of yr., Macclesfield, 2°·5 below av. Min. temps., Cheadle [Dec. 7th ?], below 0°; Jan. 29th, 15°·6: Congleton, Dec. 5th, heavy snow storm; 6th, 4°. W. Cheshire, Chester, alt., 64 ft.; Dec. 5th, 16°·4: Neston, alt., 218 ft.; Dec. 4th, 19°·5: Bidstone, alt., 180 ft.; Dec. 2nd and 4th, 22°.

Plants injured, 1879-80 — 18 (1), 28 (2), 8 (3), total at 3 places.

LANCASHIRE. *Rainfall*, heavy during summer; Oct., Nov. and Dec., dry (Allerton, Withington); 3·5 ins. below av. (Rochdale): excessive in June, July, Aug.; but not above av. (Crooke Hall). Min. rainfall, Gorton, alt., 263 ft.; 30·66 ins.: max., Bridge End (Little Langdale), alt., 385 ft.; ht., 9 ins.; 96·62 ins., on 168 days. All crops bad, def. in quant. and quality (Crooke Hall). Fruit crop, large but difficult to ripen (Holker Gardens). *Min. temps.*, Blackpool, alt., 30 ft.; Dec. 5th, 4°: Garstang, alt., 58 ft.; Dec. 4th, 5°: Worsley [Dec. 7th ?] 8°: Manchester, alt., 194 ft.; Dec. 7th, 10°: Cartmel (Holker Hall), alt., 100 ft.; Dec. 4th, 11°: Stoneyhurst, alt., 382 ft.; Dec. 7th, 12°·9: Bolton, alt., 481 ft.; Dec. 7th, 13·5: Liverpool, Dec. 4th, 15°.

Plants injured, 1879-80 — 18 (1), 16 (2), 6 (3), total at 2 places.

REPORTS.

1. CHESHIRE—MANCHESTER, Cheadle.—Mr. R. Mackillar.

Gen. Char. of Soil—A brown loam; in some cases resting on gravel.

Alt. and Exposure—[Altringham, dist., 5 ms.; 115 ft.] low and sheltered.

Rainfall, 1879 — 31·86 ins.; min., Nov., 1·91 ins.; max., Aug., 5·09 ins.; total below average.

Date of Onset and Duration of Frost—About Nov. 26th to Jan. 30th.

Min. Temps. and Dates—[Dec. 7th ?] below 0°: [Manchester, dist., 6 ms., N.; alt., 194 ft.; Dec. 7th, 10°] Jan. 17th to 24th, severe.

Plants injured, 1878-79 and 1879-80 — 7 (1), 10 (2)—*Aucuba japonica*, 2. Box, 1, 2. Broccoli, 1. *Cedrus Deodara*, 1, 2. Holly, 1, 2. Laurel, common, kd. to grd., 2; Do. Portugal, kd. to grd., 2. *Laurustinus*, all, 1. *Lithospermum fruticosum*, a fine bed, entirely, 1. *Picea Pinsapo*, 20 ft., spoilt, 2. *Quercus Ilex*, all but kd., 2. *Sequoia gigantea*, much disfigured, 2. Strawberries, 2. *Taxodium sempervirens*, 1.

Plants uninjured—*Cedrus Deodara* (sheltered all round and in a thoroughly dry place), *Pinus excelsa*, *Rhododendrons*.

Observations — On a dry situation the following stood well, though slightly touched,—*Aucubas*, *Hollies* (except where branches of trees hung over them, parts of hedges being then killed or much injured), *Common Laurel* (had to be cut to grd., again recovering), *Strawberries* (many of these were so injured that a very poor crop followed in 1880; those plants with exposed stems suffered the most).

2. NANTWICH, Cholmondeley Castle.—Mr. T. Malcolm.

Gen. Char. of Soil—The upper part of the garden is a light loam, the lower part being on clay.

Alt. and Exposure—42 ft.; the kitchen garden is situated low and is very damp. It is subject to late spring frosts.

Rainfall, 1879—35·45 ins.; av. of 10 yrs., 1870-79, 35·97 ins.; max., 1872, 51·68 ins.; min., 1876, 26·20 ins. The greatest drawback in 1879 was the absence of sunshine and the continual dampness of the air; and not so much the quantity of rain.

Min. Temps. and Dates—[About 12° ? : Chester, dist., 12 ms., N.W. ; Dec. 5th, $16^{\circ}4$: Congleton, dist., 20 ms., N.E. ; Dec. 4th, 4°].

Plants injured, 1879-80—9 (1), 9 (2), 4 (3)—Apricots, 1, 2, 3. *Araucaria imbricata*, 3. *Arbutus*, 2. Broccoli, greater part, 1. Brussels sprouts, 1. Clematis Jackmanni, cut nearly to grd., 2. Figs, 2. Laurel, Bay, 1. Laurel, common, exposed, 1; others, 2. Laurustinus, 2. Pampas grass, 1, 2. Peaches, several, 1, 2, 3. *Pinus insignis*, 1. Roses, 1, 2, 3.

3. NANTWICH, Poole Hall.—Mr. W. Smith.

Gen. Char. of Soil—Of a medium texture; Red sandstone formation and well drained.

Alt. and Exposure — [Cholmondeley Castle, dist., 6 ms., W.; alt., 42 ft.].

Rainfall, 1879—[Cholmondeley Castle, 35.43 ins., on 200 days].

Min. Temp. and Date—[about 12° ? : Congleton, dist., 14 ms., N.E. ; Dec. 6th, 4°].

Plants injured, 1879-80 — 2 (1), 7 (2), 4 (3)—Apples, young, 2, 3; Blenheim Orange, young wood kd., 2. Apricots, E. wall, 1, 2; S. wall, 2. *Cedrus Deodara*, 2. Laurel, common, 2; Do. Portugal, 3. Peaches, on S. wall, 2. Pears, on Quince stock, 2. Rhododendrons, choice, 3. Roses, H. P.'s, three-fourths, 2; one-fourth, 3; Calville, Blanche d'hiver, 1.

Observations—The idea that canker is formed by frost is favoured by this year's experience; as there is a great deal of it now on all the young Apple trees; there being patches from 1 to 6 inches wide on them; which, prior to last winter, had not a spot of canker.

4. WARRINGTON, Walton Lea.—Mr. W. Kipps.

Gen. Char. of Soil—A light loam on Red sandstone rock; heavy loam on clay: Bog, well drained.

Alt. and Exposure—Sheltered only on S.W. by a plantation; situated high, exposed on N. and W. sides.

Rainfall, 1879—[Warrington, dist., 2 ms., N.; alt., 49 ft.; ht., 1 ft.; 30.76 ins., on 194 days].

Min. Temps. and Dates—[About 12° ? : Manchester, dist., 16 ms., E.; Dec. 7th, 10° : Liverpool, dist., 16 ms., W.; Dec. 4th, 15°].

Plants injured, 1879-80—14 (1), 12 (2), 14 (3)—*Arbutus Andrachne*, 1. Asparagus, 1. *Aucuba japonica*, 2. *Berberis Darwinii*, 2. Broccoli, 1. Broom, 2. Brussels sprouts, 2. Cabbages, savoy, 2. *Catalpa bignonioides*, aurea, 1. *Ceanothus dentatus*, 1. *Cedrus*

Deodara, 1. Cotoneaster, 3. Cratægus Pyracantha, lost foliage, 3. Daphne Cneorum, 2. Escallonia floribunda, 1. Euonymus japonicus, variegatus, 2. Furze, fl. pl., 1. Garrya elliptica, lost foliage, 3. Holly, lost much foliage, 3. Ivy, sorts, 3. Jasminum nudiflorum, 3. Kale, 3. Laurel, Bay, 1. Laurel, Portugal, 2. Laurus-tinus, 1. Lonicera, 3. Magnolia grandiflora, 1. Menziesia polifolia, 1. Oaks, 3. Onions, 1. Phillyrea latifolia, 2. Picea Lasiocarpa, 3; P. Pinsapo, 3. Plane, 3. Privet, 3. Rhododendrons, lost foliage, 3. Sequoia gigantea, 2; S. sempervirens, 2. Veronica, 1. Yucca gloriosa, 2.

Observations—Many plants here suffer much from W. winds, combined with the smoke from chemical works three miles off.

1. LANCASHIRE—CARTMEL, Holker Hall.—Mr. W. Fox.

Gen. Char. of Soil—Light and open; very stony upon a rocky subsoil.

Alt. and Exposure — 100 ft.; open to sea on S. and W.; the tides running to within three-quarters of a mile from the garden.

Rainfall, 1879—37.43 ins.; being a few ins. below the av.

Date of Onset and Duration of Frost—Nov. 26th to Dec. 26th. Open weather for 10 days; when frost recommenced and lasted till the end of Jan.

Min. Temp. and Date—Dec. 4th, 11°; Jan. 19th, 15°.

Plants injured, 1879-80 — 4 (1), 4 (2), 2 (3) — Arbutus Unedo, old, 12 to 14 ft., 2. Catalpa syringæfolia, large tree, last summer's (unripened) growth, 2. Ceanothus azureus, old plant, on wall, with large head above, 1. Desfontainea spinosa, on turf, sheltered, 20 yrs. old, 7 ft., 1. Garrya elliptica, var. macrophylla, on wall, 1. Laurel, Bay, 3. Laurustinus, large, 3. Quercus glabra, fine old tree, 2. Stauntonia latifolia, very luxuriant, on wall, 1. Thuja orientalis, fine old tree, 2.

Plants uninjured — Araucaria imbricata (many plants), Cephalotaxus Fortunei (bushy specimen on lawn), Desfontainea spinosa (two plants trained to trellis on wall, 12 yrs. dist. from one mentioned above), Leptospermum lanigerum (on wall), Photinia serrulata (on wall), Quercus glabra (situated on higher ground than the one mentioned and well sheltered).

2. LYTHAM.—Mr. R. Maries.

Gen. Char. of Soil—Sand and a sandy loam.

Alt. and Exposure—About 35 ft., above the Estuary of the Ribble; exposed from E. to W.

Rainfall, 1879—[Ht., 2 ft.; 34.32 ins., on 244 days].

Date of Onset and Duration of Frost—Nov. 14th and 15th, 27°; frost from 29 to Dec. 13; from Dec. 18th to 21st; Jan. 12th to 15th; 20th to 30th.

Min. Temps. and Dates—Dec. 4th, 13°; 5th and 7th, 22°; Jan. 20th, 20°; 27th, 21°.

Plants injured, 1879-80—11 (1), 13 (2), 5 (3)—Apples, a few 8 yrs. old, E. side of hedge, all, 1. *Araucaria imbricata*, 2. *Arbutus Unedo*, 1. *Artichoke*, globe, 1. *Aucuba japonica*, male, 1; female, 3. *Azalea amœna*, recovering, 2. *Berberis Darwinii*, kd. to grd., 2. *Ceanothus azureus*, 1. *Cedrus Deodara*, in shady place, 1; elsewhere, 2. *Clematis*, hybs., a few old plants, 1; others, 3. *Escalonia macrantha*, kd. to grd., 2. *Euonymus*, many sorts, kd. to grd., 2. *Furze*, 1. *Holly*, young growth, kd., 3. *Hydrangeas*, kd. to grd., 2. *Jasminum*, large yellow, 1. *Laurel*, common, kd. to grd., 2; Do. Portugal, kd. to grd., 2. *Laurustinus*, 1; kd. to grd., 2. *Ligustrum japonicum ovalifolium*, 2. *Lonicera brachypoda aureo-reticulata*, fine plant, 16 yrs., on S. wall, kd. to grd., 2. *Rhododendrons*, lost fir. buds, 3. *Rosemary*, 1. *Roses*, red and pink China, H. P.'s, and Teas, all kd. to grd., 2. *Salisburia adiantifolia*, 3. *Veronica*, 1.

3. ROCHDALE, One Ash.—Mr. B. Thompson.

Gen. Char. of Soil—Light and tenaceous, of the Upper Coal Measures; subsoil, clay.

Alt. and Exposure—473 ft.; exposed to N., N.E. and E.

Rainfall, 1879—[Ht., 3 ft. 7 ins.; 35.77 ins., on 200 days].

Date of Onset and Duration of Frost—Oct. 15th and 16th; then occasionally till Nov. 21st; then 41 days, continuously, till Jan. 1st; then 8 days thaw, followed by 26 days of frost.

Min. Temps. and Dates—Dec. 7th, 8°.5; Jan. 20th, 8°.8.

Plants injured, 1879-80 — 8 (1), 3 (2), 1 (3)—*Auriculas*, 1. *Blackberry*, American, 1. *Daphne Mezereum*, 1. *Holly*, 2. *Pinus excelsa*, 1. *Polyanthus*, 1. *Raspberries*, 2. *Rhododendrons*, 3. *Roses*, 1, 2. *Strawberries*, 1. *Violets*, 1.

Plants uninjured—*Myrtles* (broad leafed Roman) unprotected.

DIVISION IX.—YORKSHIRE.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM
YORKSHIRE.

WEST RIDING. A cold wet year; Dec., the finest month but intensely cold (Ranmoor). Year noted for low temp. and absence of sun, with severe frost in mid. Sept. (Wath-upon-Dearne, Ilkley, &c.). No summer; the last 3 months calm and dry (Ilkley). *Rainfall*, 4·19 ins. below av. of 8 yrs. (Aldbrough); 5 ins. below av. of 10 yrs. (Thorpe); 3 ins. below av. of 14 yrs. (Bashall Lodge). *Min. rainfall*, Goole, alt., 21 ft.; ht., 3 ft. 4 ins.; 19·80 ins., on 156 days: max., Langdon Brook, Slaidburn, alt., 556 ft.; ht., 1 ft. 2 ins.; 66·17 ins. *Min. temps.*, Dec. 7th—Campsall, alt., 60 ft.; 10°: Ribston, alt., 130 ft.; -7°: Grimston, -6°: Knaresborough, alt., 180 to 200 ft.; -4°: Stanley and Wakefield, alt., 100 ft., 0°: Skipton, Dec. 6th, 9°: and Leeds, Dec. 4th, 9°·8; Jan. 27th, 21°.

Plants injured, 1879-80 — 50 (1), 60 (2), 29 (3), total at 5 places.

EAST RIDING. A cold, dull, sunless year. *Rainfall*, to April 30th, about av.; to Sept., above av.; in Oct., Nov., and Dec., much below av. The first week in Dec., coldest on record (Hull, Great Givendale, Ganton, &c.). *Min. rainfall*, Hornsea, alt., 40 ? ft.; ht., 3 ft.; 22·22 ins.: max., Wold Newton, alt., 195 ft.; ht., 1 ft. 9 ins.; 42·45 ins., on 204 days. *Min. temps.*, Welton House, alt., 80 ? ft.; Dec. 7th, 2°; 12th, 4°: Houghton Hall, alt., 154 ft.; Dec. 3rd, 7°: Hull, Dec. 7th, 7°: Spurne Head, alt., 28 ft.; 25°.

Plants injured, 1879-80 — 21 (1), 45 (2), 31 (3), total at 3 places.

NORTH RIDING. A cold damp year, on the whole; but Oct. was fine, with more sunshine than usual (Forcett Pk.). *Rainfall*, not very heavy; and last 3 months very dry (Richmond); nearly 5 ins. below av. (Malton). *Min. rainfall*, Middlesborough, alt., 21 ft.; 18·57 ins., on 138 days; *the least fall in England*: max., Hawes, alt., 1100 ft.; 56·59 ins., on 228 days. *Min. temps.*, Bedale, alt., 151 ft.; Dec. 4th, -9°: York, alt., 55 ft.; Dec. 7th, -4°·5 and 0°:

Beningborough Hall, Dec. 7th, -2° : Aysgarth, alt., 660 ft.; Dec. 7th, $2^{\circ}7$: Scarborough, alt., 115 ft.; Dec. 2nd, $19^{\circ}5$.

Plants injured, 1879-80 — 13 (1), 13 (2), 4 (3), total at 3 places.

REPORTS.

1. W. RIDING — CLITHEROE, Bolton-by-Bowland.—Mr. R. Milne-Redhead.

Gen. Char. of Soil—A calcareous loam.

Alt. and Exposure—About 450 ft.; S.E. to W.

Rainfall, 1879 — [Clitheroe, Downham Hall, dist., 6 ms.; alt., 464 ft.; ht., 1 ft. 6 ins.; 38.45 ins.].

Min. Temps. and Dates — [Stoneyhurst, dist., 10 ms., S.; Dec. 7th, $12^{\circ}9$: Skipton, dist., 12 ms., E.; Dec. 6th, $9^{\circ}0$].

Plants injured, 1879-80 — 7 (1), 2 (2), 2 (3)—*Aralia Sieboldii*, 1878-9, 1; 3. *Araucaria imbricata*, 3. *Arbutus Andrachne*, 78, 1; A. *Unedo*, 78, 2; 1. *Cephalotaxus Fortunei*, 78, 3. *Cryptomeria japonica*, Lobbii, 3. *Cupressus Corneyana*, 78, 1. *Furze*, fl. pl., 78, 3. *Hibiscus syriacus*, 2. *Juniperus drupacea*, 1. *Liriodendron tulipifera*, 78, 2; 1. *Pinus insignis*, 78, 2; 1. *Prumnopitys (Podocarpus) elegans*, 2. *Quercus Cerris*, 78, 1; Q. "Luccombe Oak," 78, 2; 1; Q. *Suber*, 78, 1. *Sequoia sempervirens*, 78, 2; 1.

Plants uninjured, 1878-79 and 1879-80—*Abies Douglasii*, A. *Alcoquiana*, A. *canadensis*, A. *Engelmannii*, A. *Hookeriana*, A. *Menziesii*, A. *polita*, *Chamæcyparis glauca*, *Cryptomeria elegans*, Holly (all kinds), *Jasminum nudiflorum*, *Juniperus occidentalis*, J. *phoenicea*, J. *virginiana*, *Kalmias*, *Osmanthus ilicifolius*, *Picea amabilis*, P. *Baberensis*, P. *cephalonica*, P. *grandis*, P. *Lasiocarpa*, P. *magnifica*, P. *Nordmanniana*, P. *nobilis*, P. *Pinsapo*, *Retinospora ericoides*, R. *filicoides*, R. *obtusata*, R. *pisifera*, R. *plumosa*, R. *p. aurea*, R. *squarrosa*, *Salisburia adiantifolia*, *Thuja* (all kinds), *Thujopsis dolabrata*, T. *nutkaensis*.

2. DONCASTER, Brodsworth Hall.—Mr. W. Chuck.

Gen. Char. of Soil—Strong calcareous, resting on limestone.

Alt. and Exposure—The kitchen garden lies in a valley running E. and W. with a brook at the bottom. The pleasure grounds are high and exposed to N.W. winds.

Rainfall, 1879 — [Doncaster, dist., 4 ms., S.E.; alt., 35 ft.; 21·04 ins., on 150 days].

Min. Temps. and Dates—Dec. 7th, 5°: [Doncaster, alt., 40 ft. ?; Dec. 7th, -5°; snow on 1st, 4th and 5th: Campsall, dist., 5 ms., N.E.; alt., 60 ft.; Dec. 7th, -10°: Sheffield, dist., 15 ms., S.W.; alt., 260 ft.; Dec. 7th, 3°].

Plants injured, 1879-80—9 (1), 15 (2), 8 (3)—Apples, mostly cankered trees, 2, 3. Apricots, 1, 2, 3. Araucaria imbricata, 2, 3. Asparagus, 1, 2. Aucuba japonica, 1, 2, 3. Broccoli, 1000, 1. Cedrus Deodara, 2. Euonymus, radicans, variegated, 2; E. r. albo-marginatus, 2; E. r. aureus, 1, 2. Laurel, common, 110, 1; 150, 2; 200, 3; Do. Portugal, 100, 3. Laurustinus, 50, 1; 150, 2. Nectarines, 2. Peaches on S. wall, 1, 2. Pears, 2, 3. Roses, mostly H. P.'s, 400, 1; 500, 2; 200, 3.

3. DONCASTER, Campsall.—Mr. F. B. Frank.

Gen. Char. of Soil—A strong loam.

Alt. and Exposure—About 60 ft.; aspect, S.

Rainfall, 1879—29·12 ins.; av. 26 ins.

Date of Onset and Duration of Frost—Nov. 13th to Jan. 31st, with an interval of the first 13 days of Jan.

Min. Temp. and Date—Dec. 7th, -10°, in kitchen garden.

Plants injured, 1879-80—4 (1), 9 (2), 0 (3)—Artichoke, globe, 1. Aucuba japonica, 2. Cedrus Deodara, 2. Euonymus, 2. Laurel, Bay, 2. Laurel, common, 2. Laurustinus, 2. Rosemary, 1. Roses, H. P., 1, 2; Standards, 1. Sequoia, 2. Yew, 2.

4. KNARESBOROUGH.—B. T. Woodd, Esq.

Gen. Char. of Soil—A strongish loam.

Alt. and Exposure—150 to 200 ft.; sheltered from N. and E.: open to S. and W.

Rainfall, 1879 — [Harrowgate, dist., 3 ms.; alt., 380 ft.; ht., 1 ft.; 31·37 ins., on 158 days].

Date of Onset and Duration of Frost—Nov. 30th to Dec. 15th; Jan. 14th to Feb. 3rd.

Min. Temp. and Date—Dec. 7th, -4°.

Plants injured, 1879-80—10 (1), 20 (2), 3 (3)—Abies Morinda, 2. Aucuba japonica, 1, 2. Broom, 1, 2. Cistus ladaniferus, 1. Cryptomeria elegans, 3. Daphne Mezereum, 2. Deutzia gracilis, 1. Escallonia macrantha, 1. Euonymus, 1878-79, 1. Fuchsias, common, 2. Furze, 1, 2. Holly, common, 2; Do. variegated, 2. Laurel, Bay,

kd. to grd., 2. Laurel, common, many, 1, 2; Do. Portugal, 3. Laurustinus, 2. Lonicera brachypoda, aureo-reticulata, 1, 2. Pampas grass, 2. Picea Pinsapo, 2. Privet, 2. Quercus Ilex, 2. Quinces, 2. Rosa rubiginosa, 3. Roses, many, esp. Stands., 1, 2. Southernwood, 2. Taxodium sempervirens, 1. Wistaria sinensis, 2.

Plants uninjured—Some Hollies, Portugal Laurels and Sequoia gigantea.

5. WETHERBY, Ribstone Hall.—Mr. T. Jones.

Gen. Char. of Soil—Light and calcareous.

Alt. and Exposure—130 ft.; aspect S.

Rainfall, 1879—26·96 ins.; av. of 13 yrs., 26·70 ins.

Date of Onset and Duration of Frost—Nov. 27th [to near the end of year: York, dist., 12 ms.; Jan. 20th, 20°].

Min. Temp. and Date—Dec. 7th, -7°.

Plants injured, 1879-80—21 (1), 13 (2), 16 (3)—Abies Morinda, 3. Apricots, 1, 2, 3. Asparagus, 2. Aucuba, 2. Berberis Darwini, 1, and kd. to grd., 2; B. stenophylla, 1, and kd. to grd., 2. Box, 1, 3. Cedrus Deodara, 3. Cherries, Morello, 1, 2, 3. Cryptomeria elegans, 1. Cupressus macrocarpa, 1. Daphne Laureola, where sheltered only, 3. Elm, where sheltered, 3. Fennel, 1. Holly, 1, 2, 3. Honeysuckle, 3. Horehound, 1. Ivy, where much sheltered, 1, 3. Juniperus recurva, 1. Laurel, Bay, 1. Laurel, common, 2; Do. Portugal, 2. Laurustinus, 1. Mulberry, 3. Nectarines, 1, 2, 3. Oaks, 3. Peaches, 1, 2, 3. Picea Pinsapo, 3. Pinus macrophylla, 3. Privet, 2. Rosemary, 1. Roses, Dwf. Teas, one-half, 1; Stands., nearly all, 1. Rue, 1. Taxodium sempervirens, 2. Vegetables, all kinds (except curled Scotch Kale), 1. Yew, 3.

Observations—Box and Ivy were quite dead where much sheltered; where a little exposed, only slightly injured; and where fully exposed they were not hurt at all. Similar was it with Hollies, Oaks and Elms. Of Hollies there are many specimens from 20 to 40 ft. high; some were killed, others are recovering.

1. E. RIDING, Bridlington, Boynton (B) — N. RIDING, Malton, Hildenley (H) and Whitby, Robin Hood's Bay (R).—C. W. Strickland, Esq.

Gen. Char. of Soil—Surface soil, chiefly chalk, gravel and sand (B): rather strong and upon coralline oolite (H): Lias clay (R).

Alt. and Exposure—A valley in the chalk two and a half miles from the sea (B): about 250 ft. on the side of a hill, facing S. (H):

in an amphitheatre of high hills facing E. (R).

Rainfall, 1879—About 27 or 28 ins. (B); 26 ins. (H); probably about 30 ins. (R).

Min. Temps. and Dates—About 2° or 3° (B); [Dec. 7th ?] -2° or -3° (H); [Above 10° ? (R): Scarborough, dist., 19 ms.; alt., 115 ft.; Dec. 2nd, 19°·5].

Plants injured, 1879-80 — 7 (1), 25 (2), 15 (3)—*Acer macrophyllum*, young (B and H), 3; *A. palmatum*, small (H), 3. Ash, many, 1, 2. *Aucuba japonica* (H), 2. *Berberis Darwinii* (H), 1, 2. *Carya*, sp., 2. *Cephalotaxus Fortunei* (H), 3. *Cupressus macrocarpa* (H), 1, 2. *Dacrydium Franklinae*, small plants (H), 2. *Elæagnus* sp., 3. *Escallonia macrantha* (B), 2; (R), 3 or unhurt. *Euonymus japonicus*, old, 10 ft. (H), 2. Hickory, 1 sp., (B), 2. Holly, 2. *Hypericum patulum* (H), kd. to grd., 2. *Jasminum officinale*, on S. wall, 3. *Juglans*, black American (B and H), 2. *Kœlreuteria paniculata* (H), 3. Laurel, Bay, 2. Laurel, common, 3. *Laurustinus*, 2. *Lonicera flexuosa*, kd. to grd., 2; *L. fragrantissima*, 15 to 20 yrs., kd. to grd., 2. *Notholaena Marantæ*, 1. Oaks, in vale of Pickering, 1, 2; (H), 3. *Picea Pinsapo*, 3. Plane (B and H), 2. *Podocarpus andina* (H), 2. *Quercus Ilex* (B), 2, (R) 3 or unhurt; *Q. succirubra*, 30 ft. (B), 1878-9, 2; unhurt, 1879-80. *Raphiolepis ovata* (H), many, 1. *Ribes sanguineum*, 2. *Roses*—double Ayrshire, Jaune Desprez, and Noisette, 3. “Ruga” and old monthly, kd. to grd., 2. *Sophora japonica* (H), 3. *Taxodium sempervirens* (H), 3. Walnut (B and H), 2. *Wistaria sinensis*, 3. Yew, 15 ft. (B), 1, (B and H), 2.

Plants uninjured — *Acer Lobelii*, *A. macrophyllum*, above 10 ft. high (B and H), *A. Negundo* (B and A), *A. platanoides* (?) (purple var., B and H), *A. sp.*, from E. States (R), *Ampelopsis Veitchii*, *Araucaria imbricata*, *Berberis aquifolia*, *B. asiatica*, *B. dulcis*, *B. ilicifolia*, *B. japonica* (all vars.), *Bignonia radicans*, *Buxus balearicus*, *Carya* sp., *Clematis* sp., *Cryptomeria elegans*, *C. japonica*, *Cupressus Lawsoniana*, *C. Nutkaensis*, *Dimorphanthus mandshuricus*, *Escallonia macrantha*, *Euonymus japonicus*, Firs, *Fraxinus* sp. (from Oregon), *F. mandshuricus*, Hickory, 3 or 4 sp., 60 to 70 yrs. old, 30 ft. high (B), *Juniperus excelsa*, Bay Laurel, *Libocedrus decurrens*, Oaks (B), Pines, *Quercus Ilex*, *Q. succirubra*, *Retinospora obtusa*, *R. pisifera*, *R. plumosa*, *Taxodium sempervirens* (H), *Thuja gigantea* and vars., *Thujopsis dolabrata*, Yew.

Observations — *Araucaria imbricata*, as usual, is quite unhurt on

a dry soil (B and H); it seems to thrive particularly well upon chalk and limestone. Ash, many died or nearly so, but more I believe through the dry weather in May than by the cold in winter. *Aucuba*, the green vars. appear to be hardier than the old speckled. *Buxus balearicus* is not hardy "inland." Holly, a great many were kd. to grd., and some few quite kd., in 1860-61. Oaks, many hundreds of large size were killed on Dec. 25th, 1860, at Howsham near York. "Luccombe," a specimen of this tree, 30 ft., nearly kd., 1878-79; uninjured, 1879-80 (B); as with other sp. it is the extreme ends of the upper branches which are alive. *Picea Pinsapo*, lost leaves from upper and outer shoots, a frequent occurrence in severe weather. *Wistaria*, did not flower, 1880.

2. HULL, Welton House.—Mr. C. Lawton.

Gen. Char. of Soil—A calcareous loam with sandy gravel and a subsoil of chalk.

Alt. and Exposure—60 to 100 ft.; exposed to S.E., S., and S.W.

Rainfall, 1879—29·67 ins., on 212 days.

Date of Onset and Duration of Frost—Nov. 11th to Dec. 30th; Jan. 9th to 31st; with but little intermission.

Min. Temps. and Dates—Dec. 7th, 2° [Hull, dist., 8 ms., E.; Dec. 7th, 7°: Houghton Hall, dist., 8 ms., N.W.; Dec. 3rd, 7°].

Plants injured, 1879-80—8 (1), 9 (2), 7 (3)—*Abies Morinda*, 2. Apples, 3. *Araucaria imbricata*, pts. kd., 3. Broccoli, 1. *Cedrus Deodara*, 30 ft., 1, 2. Cherry, wild, 3. *Cryptomeria japonica*, 3. Elm, diff. vars., many branches kd., 2. Laurel, common, 1, 2; L. Portugal, 2. Lavander, 1. Magnolia, 1, 2. Oaks, 3. Peaches, 1, 2. *Pinus Cembra*, 3. Rosemary, 1. Roses, Dwfs., 2; Stands., 1, 2. *Taxodium sempervirens*, pts. of branches kd., 3.

3. MARKET WEIGHTON, Dalton Hall.—Mr. J. Allsop.

Gen. Char. of Soil—Stony, inclined to clay; 2 to 8 ft.; resting on chalk.

Alt. and Exposure—154 ft.; well sheltered with woods, and free from water and elevated.

Rainfall, 1879—25·79 ins.

Min. Temp. and Date—Dec. 3rd, 7°.

Plants injured, 1879-80—6 (1), 13 (2), 9 (3)—Apples, 3. *Arbutus*, 2. Artichoke, globe, 2. *Aucuba japonica*, 3. *Biota or. aurea*, 2. Broccoli, 1. Brussels sprouts, 3. Cabbages, savoys, 2. *Cistus ladaniferus*, 1. Furze, and fl. pl., 1, 2. *Herbaceous roots*, 1, 2, 3. *Laurustinus*, 2. Lettuce, 2. *Leycesteria formosa*, 2.

Magnolia grandiflora, 1, 2. Peaches, 2. Pears, 3. *Picea Pinsapo*, 3. *Quercus Ilex*, 2, 3. Roses, 1, 2, 3. *Taxodium sempervirens*, 3.

4. MARKET WRIGHTON, Dalton Hall, (a valley, 5 ms. dist., from).

Gen. Char. of Soil—Light : without much or any shelter.

Min. Temp.—About 0° ?.

Plants injured, 1879-80 — 20 (1), 54 (2), 14 (3)—*Abies*, *Hoo-keriana*, 3 ; *A. Menziesii* (*Sitchensis*), 2 ; *A. Morinda*, 2. *Ampelopsis*, 2. Apples, 2. *Araucaria imbricata*, 2. *Arbutus Unedo*, 1. *Berberis Darwinii*, 1, 2 ; *B. japonica*, 2 ; *B. stenophylla*, 2 ; *B. Wallichii*, 2. *Bignonia radicans*, 2. *Biota orientalis*, 2 ; *B. or. aurea*, 2 ; *B. or. elegantissima*, 2. Box, new golden and rosemary-leaved, 2. *Cephalotaxus Fortunei*, 2. *Cistus laurifolius*, 1. *Cotoneaster acuminata*, 2 ; *C. Simonsii*, 2. *Cratægus Pyracantha*, 1. *Cryptomeria japonica*, 2. *Cydonia japonica*, 2. *Daphne Cneorum*, 3. *Deutzia gracilis*, 3. *Escallonia macrantha*, 2. *Euonymus japonicus*, 2 ; *E. j. elegantissimus*, 1 ; *E. j. latifolius*, *albo-variegatus*, 2. *Forsythia*, 2. Furze, fl. pl., 1. *Garrya elliptica*, 2. *Genista cinerea*, 2. *Hibiscus*, of sorts, 2. Holly, common, 2 ; Dahoon, yellow berried, 2 ; Golden and silver-leaved, 2. *Hydrangea hortensis*, 2 ; *H. paniculata*, 2. *Indigofera floribunda*, 2. *Jasminum nudiflorum*, 2 ; *J. officinale*, 2. Larch, 2, 3. Laurel, Bay, 1. Laurel, common, 1 ; Do. broad leaved, 2 ; Do. narrow leaved, 1 ; Do. round leaved, 2 ; L. Portugal, 2 ; Do. azorica, 2 ; Do. myrtle-leaved, 1. *Laurustinus*, 1. *Ledum*, 2. *Leycesteria formosa*, 1. *Ligustrum japonicum*, 1 ; *L. j. latifolium*, 3 ; *L. j. ovalifolium*, 2 ; *L. j. variegatum*, 2. *Magnolia grandiflora*, 1. *Osmanthus ilicifolius*, *variegatus*, 3. Pampas grass, 1, 2. Peaches, 2. Pears, 3. *Pernettya*, sorts, 2. Poplar, Lombardy, 1. *Prumnopitys elegans*, 2. *Prunus sinensis*, 1. *Quercus austriaca*, *sempervirens*, 3 ; *Q. Cerris*, *variegata*, 3 ; *Q. coccinea*, 3 ; *Q. Ilex*, 2. *Retinospora lycopodioides*, 2 ; *R. squarrosa*, 2. *Rhus Cotinus*, 3 ; *R. C. glabra*, *laciniata*, 3. Roses, esp. Stands., 1, 2. *Skimmia japonica*, 3. *Taxodium distichum*, 2 ; *T. sempervirens*, 2. *Vitis heterophylla*, 2. *Wistaria sinensis*, 1.

1. N. RIDING *—BEDALE.—Sir H. Bereford-Peirse, Bart.

Gen. Char. of Soil—Sandy and generally light.

Alt. and Exposure — 151 ft. 8 ins. ; not exposed, being situated in a valley.

* See also E. RIDING, Rep. 1, p. 99.

Rainfall, 1879 — Nearly 33 ins. [Leyburn, dist., 6 ms., W.; alt., 660 ft.; ht., 1 ft.; 29·87 ins.].

Date of Onset and Duration of Frost—Nov. 29th, 22°, continued to Dec. 25th.

Min. Temps. and Dates—Dec. 4th, -9° [Aysgarth, dist., 14 ms., W.; alt., 660 ft.; Dec. 7th, 2°·7].

Plants injured, 1879-80—5 (1), 2 (2), 1 (3)—Berberis, 1. Cedrus Deodara, large tree not much exposed, 1. Hollies, all kinds, 2. Laurel, common, 1; Do. Portugal, 1. Roses, all Stands., 1; 10,000 lost in Bedale (Fowler); 15,000 Dwfs. and Stands., in York (Back-house). Yew, 2; Do. Irish, 3.

2. YORK, Beningbrough Hall —Mr. A. Foster.

Gen. Char. of Soil—Alluvial, on clay; on New Red Sandstone formation.

Alt. and Exposure—About 50 ? ft.; on banks of River Ouse.

Rainfall, 1879—[Thirsk, dist., 14 ms., N.W.; alt., 118 ft.; ht., 1 ft.; 28·35 ins.].

Date of Onset and Duration of Frost—Nov. 13th, followed by 8 days of frost: 27 days in Dec.; 19 in Jan.

Min. Temps. and Dates—Dec. 7th, -2°: [York, dist., 7 ms., E.; alt., 55 ft.; Dec. 6th, 0°; Dec. 7th, -4°·25].

Plants injured, 1879-80—6 (1), 10 (2), 2 (3)—Arbutus, kd. to grd., 2. Aucubas, 2. Berberis Darwinii, 1. Cotoneaster japonica, 2. Garrya elliptica, 1, 2. Holly, 2. Laurel, Bay, 2. Laurel, common, 2; Do. Portugal, very old, 2. Laurustinus, 1. Ligustrum japonicum, latifolium, 3. Rhododendron ponticum, 50 yrs., 1. Roses, Stands., 1, 2. Sequoias, lost leaders, 3. Yew, probably from wet soil, 1, 2.

3. YORK, Whitwell Hall.—E. V. Harcourt, Esq.

Gen. Char. of Soil—Chiefly clay, with some sand over oolite.

Alt. and Exposure—About 280 ft.; with some shelter by trees on all sides.

Rainfall, 1879—[Malton, dist., 6 ms., N; alt., 75 ft.; ht., 1 ft.; 23·28 ins.].

Date of Onset and Duration of Frost — Nov. 13th; with little interruption till Dec. 31st. Frost returned Jan. 16th, and lasted 3 weeks.

Min. Temp. and Date—Dec. 7th, 0°·1.

Plants injured, 1879-80—Laurels, common and Portugal, a few 1 and 2, many 3. Roses, many 1.

DIVISION X.—N. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879, FROM CUMBERLAND, DURHAM, NORTHUMBERLAND AND WESTMORELAND.

CUMBERLAND. The driest year but one (1867) since 1864; but cold, dark and sunless: *Rainfall*, below av. of 17 yrs. (Cockermouth). Cold weather till May 17th; June to Aug., wet; but total rainfall 30·49 ins., av. of 8 yrs. being 41·86 ins. (Blencowe). Rainfall 10 ins. below av. of 23 yrs. (Whinfell Hall). Min. rainfall, Penrith, alt., 575 ft.; ht., 5 ft.; 24·26 ins., on 163 days: max., The Sty, 1077 ft.; ht., 6 ins.; 148·55 ins. At 6 places, fall, over 100 ins. Seathwaite, alt., 422 ft.; mean of 3 estimates, 107·55 ins.; mean of 20 yrs. (1850-69), being 140·51 ins. Difference, 32·96 ins., below av. Fruit crops worthless, from cold and wet (Carlisle). *Min. temps.*, Dec. 7th,—“Nr. Carlisle,” Dec. 6th, -8°: Kirklington, alt., 20 ft.; -5°: Alston, alt., 1145 ft.; -4°: Carlisle, alt., 114 ft.; 1°·5: Scaleby, alt., 111 ft.; 3°: Stapleton, alt., 400 ft.; 4°: Dalston, alt., 164 ft.; 4·5: Silloth, alt., 29 ft.; 8°: Cockermouth, alt., 144 ft.; 9°·8; Jan. 20th,—Carlisle, 15·3: Scaleby, 16°: Cockermouth, 17°·1: Silloth, 18°·5.

Plants injured, 1879-80 — 58 (1), 38 (2), 43 (3), total at 7 places.

DURHAM. Very severe cold during winter (1878-9) and spring; wet summer, fine and warm Oct., severe cold, Dec. (Whorlton). *Rainfall*, 3·81 ins., below av. (Heighington). Below av. of 20 yrs. (Seaham). The coldest of 30 yrs.; nearly all vegetable crops a failure (Seaham). Rainfall, 5th yr. above av., the excess being nearly all in summer (Sunderland). Min. rainfall, Hartlepool (Hart Res.), alt., 164 ft.; ht., 9 ins.; 21·71 ins., on 101 days: max., Heugh Lighthouse, alt., 34 ft.; ht., 6 ins.; 31·39 ins., on 261 days. *Min. temps.*, Chester-le-Street, Dec. 4th -6°: Darlington, alt., 140 ft.; Dec. 1st and 4th, -5°: Gainford, alt., 225 ft.; Dec. 3rd, -2°: Durham, alt., 340 ft.; Dec. 4th, 4°·4: Lambton, alt., 15 ft.; Dec. 4th, 5°: Whitburn, alt., 100 ft.; Dec. 4th [?], 6°: Sunderland, alt., 125 ft. [?]; Dec. 4th, 9°.

Plants injured, 1879-80—40 (1), 30 (2), 12 (3), total at 5 places.

NORTHUMBERLAND. Spring and summer very cold; Sept. and Oct., very fine; Nov., wet; Dec., severe (North Shields). *Rainfall*, in June and July; excessive; that of Sept. and Oct., remarkably small (Pawston.) Min. rainfall, Morpeth, alt., 24 ft. (?) ; 23·55 ins. : max., Cheviot, alt., 1692 ft. ; ht., 4 ft. ; 77·63 ins. *Min. temps.*, Dec. 3rd,—Morpeth, -11° : Alnwick, alt., 182ft. ; -2° : Dec. 4th,—Belford* and Fowberry,† -16° : Morpeth, -12° : Bingfield, alt., 445 ft. ; and Wark, alt., 400 ft. ; -10° : Hexham,‡ -9° : Corbridge, alt., 270 ft. ; -5° : Cornhill, -4° : Alnwick, 3° : Newcastle, 7° : Bywell, 1° : and N. Shields, alt., 98 ft. ; 8°·5 : Dec. 5th,—Bywell, 4° : N. Shields, 11°·7 ; Jan. 20th, 22°·2.

Plants injured, 1879-80—15 (1), 31 (2), 11 (3), total at 3 places.

WESTMORELAND. A severe winter, a cold spring, a sunless summer, and a fine autumn (Whelprigg). *Rainfall*, below av. (Brathay, Ambleside) ; 10 ins., below av. (Kirkby Stephen). Min. rainfall, Brougham Hall (Penrith), alt., 470 ft. ; ht., 5 ft. 5 ins. ; 25·20 ins. : max., Kirkstone Pass, alt., 1500 ft. ; ht., 1 ft. ; 82·85 ins. *Min. temps.*, Belfield, Dec. 3rd to 8th, respectively, 1°, -2°, 0°, 6°, 1° and 6° : Kendal [dates ?] 8°, 11°.

Plants injured, 1879-80 — 10 (1), 5 (2), 9 (3), total at 2 places.

REPORTS.

1. CUMBERLAND—CARLISLE, Castletown.—Mr. A. Smith.

Gen. Char. of Soil—A light sandy loam.

Alt. and Exposure—About 100 ft.

Rainfall, 1879—29·33 ins. ; av. of 10 yrs. (1870-79), 31·54 ins. ; min., 1878, 27·23 ins. ; max., 1877, 43·87 ins.

Date of Onset and Duration of Frost—[Near Carlisle, frost began

* *Jl. of Hort.* 1879, p. 464.

† *Gard. Chron.* 1879, p. 765, Mr. G. Culley reports :—"The therm. in my garden, 2 ft. from the grd., marked 16° below zero, at 5 a.m. At 9 a.m. a therm. 20ft. from the grd. marked 7° below zero, and during the day never rose higher than 4° above zero. The greatest amount of cold registered in my garden during last winter (1878-79) was 8° below zero, and during the winter (1860-61) 13° below zero. I do not suppose there is any reliable record of so cold a day as yesterday in England." [Belford is dist. about 3 ms. ; where -16° is also recorded].

‡ *Gard. Chron.* 1879, p. 765.

Nov. 29th, 18°; 30th, 14°; Dec. 1st, 12°; 2nd, 25°; 3rd, 15°; 4th and 5th, 10°; 6th, -8°].*

Min. Temps. and Dates—[Dec. 4th ?], about 1°: [Dalston, alt., 164 ft.; dist., 5 ms. [?], S.; Dec. 4th, 4°·5: Scaleby, alt., 111 ft.; dist., 6 ms. (?), N.E.; Dec. 4th, 3°·0].

Plants injured, 1879-80—8 (1), 1 (2), 2 (3)—*Aucuba japonica*, 2. *Buddlea globosa*, 1. Laurel, Bay, 1. Laurel, common, 3; Do. Portugal, 3. *Vegetables*, Beet (White), Broccoli, Cabbage, Celery, Lettuce (hardy green), Spinach, nearly all, 1.

Observations—Fruit in 1880; Apples and Pears, very few but good; Currants, Gooseberries, Plums (on walls), Raspberries and Strawberries, good crops.

2. CARLISLE, Rose Castle.—Mr. S. Foster.

Gen. Char. of Soil—Strong and loamy.

Alt. and Exposure—114 ft.

Rainfall, 1879—29·33 ins., on 172 days.

Date of Onset and Duration of Frost—Sept., 5 nights of frost; in Oct., 15; Nov., 21; Dec., 29; Jan., 22.

Min. Temps. and Dates—[Carlisle, Dec. 3rd, 4°·4; 4th, 1°·5; Jan. 20th, 15°·3: Scaleby, dist., 5 ms., N.; alt., 111 ft.; Dec. 4th, 3°: Dalston, dist., 4 ms., S.; alt., 164 ft.; Dec. 4th, 4°·5: Alston, dist., 20 ms., S.E.; alt., 1145 ft.; Dec. 4th, -4°].

Plants injured, 1879-80 — 37 (1), 16 (2), 12 (3)—*Acacia* [*Robinia pseudacacia* ?], 2. *Ailanthus glandulosus*, 1. *Aralia japonica*, 1. *Araucaria*, 2. *Arbutus procera*, 1. Artichoke, globe, 1. *Aucuba*, 2. *Azara microphylla*, 1. *Berberis Darwinii*, 3. *Biota orientalis*, 3. Broccoli, 1. Brussels sprouts, 3. *Buddlea globosa*, 1. *Bupleurum fruticosum*, 1. *Buxus balearicus*, 1. Cabbage, Savoys, 3. *Caprifolium flexuosum*, 1. *Catalpa syringæfolia*, 1. *Ceanothus azureus*, 1. *Cedrus Deodara*, 3. Celery, 1. *Cercis siliquastrum*, 1. *Chimonanthus fragrans*, 1. *Cistus ladaniferus*, 1. *Cupressus Lambertiana*, 1. *Dimorphanthus mandshuricus*, 1. *Escallonia Ingrami*, 1; *E. macrantha*, 1. *Eugenia apiculata*, 3. *Euonymus japonicus*, 1. *Eurybia argophylla*, 1. *Fabiana imbricata*, 1. Furze, 1. *Garrya elliptica*, 1. *Griselinia littoralis*, 1. *Halesia tetraptera*, 1. Hollies, 2. *Koeleruteria paniculata*, 1. Laurel, Bay, 1, 2. Laurel, common, 1, 2. *Laurustinus*, 1, 2. *Leycesteria formosa*, 1. *Negundo*

fraxinifolia, 3. Onions, Winter, 2. Osmanthus ilicifolius, 3. Pampas grass, 1, 2. Photinia glabra, 2. Piptanthus nepalensis, 1. Platanus occidentalis, 3. Rhamnus alaternus, 1. Raphiolepis ovata, 2. Roses, 2, 3. Salisburia, 3. Salix babylonica, 3. Santolina chamæcyparis, 1. Sequoia sempervirens, 2. Spartium junceum, 1. Tamarix africana, 2. Torreya grandis, 2. Zizyphus sativus [?], 2.

3. CARLISLE, Scaleby Hall.—R. A. Allison, Esq., F.M.S.

Gen. Char. of Soil—A stiffish loam with a clay subsoil, in part.

Alt. and Exposure—112 ft.; exposed to S.W. winds; sheltered on N. and E.

Rainfall, 1879—30·72 ins., on 202 days; of which 13·07 fell in June, July and Aug.

Date of Onset and Duration of Frost—Nov. 21st to Jan. 1st, excepting Nov. 26th, Dec. 14th, 15th, 22nd to 24th and 29th.

Min. Temps. and Dates—Dec. 4th, 3°; Jan. 20th, 16° [Stapleton, alt., 400 ft.; dist., 6 ms., N.; Dec. 4th, 5th, 4°: Carlisle, alt., 114 ft.; dist., 5 ms., S.; Dec. 4th, 1°·5].

Plants injured, 1879-80 — 2 (1), 2 (2), 3 (3)—Cedrus Deodara, 3. Laurel, Portugal, 3. Laurustinus, 1, 2. Roses, Stands., 1; others, 2. Thujas, 3.

4. LONGTOWN, Kirkclinton Hall.—Mr. J. Barry.

Gen. Char. of Soil—A loamy deposit on red sandstone.

Alt. and Exposure—About 20 ft.; well protected with forest trees.

Rainfall, 1879 — [Kirk Andrew's, dist., 4 ms., W.; alt., 100ft.; ht., 6 ins.; 35·76 ins.].

Date of Onset and Duration of Frost—Frost and snow unusually great; but not of so long continuance as in the year before.

Min. Temps. and Dates — [Dec. 4th ?] -5°: [Stapleton, dist., 5 ms., N.E.; alt., 400 ft.; Dec. 4th, 5th, 4°: Scaleby, dist., 2 ms., S.E.; alt., 111 ft.; Dec. 4th, 3°].

Plants injured, 1879-80 — Aucuba japonica, 2. Broccoli, 1.

Plants uninjured—Shrubs and trees, such as Laurels, Yews &c., stood the winter well.

5. PENRITH.—Mr. J. Curwen.

Gen. Char. of Soil—Very gravelly.

Alt. and Exposure—[575 ft. ?] Garden lies rather inclined to S.W.

Rainfall, 1879 — [Penrith, mean of 3 obs., 25·98 ins.].

Min. Temps. and Dates — [Alston, dist., 17 ms., N.E.; alt.,

1145 ft.; -4° : Belfield, E. side of Windermere, dist., 20 ms., S.E.; Dec. 4th, -2°].

Plants injured, 1879-80 — All that we have suffered from is the loss of Vegetables, such as Borecoles, Broccolis and Cauliflowers for spring use. We have comparatively few shrubs.

6. RAVEN-GLASS, Gosforth.—Miss Senhouse.

Gen. Char. of Soil—Gravelly.

Alt. and Exposure — About 190 ft.; exposed on S.E. and S.W. to sea breezes; dist., 3 ms. from sea. Mountains, dist. 10 ms., shelter the valley from the E. winds.

Min. Temps. and Dates — [Cockermouth, 6 ms. from the sea; alt., 144 ft.; dist., 17 ms., N.; Dec 4th, $9^{\circ}8$: Cartmel, alt., 100 ft.; dist., 25 ms., S.E.; Dec. 4th, 11°].

Plants injured, 1879-80 — 1 (2), 17 (3)—*Aloysia citriodora*, 3. *Aucuba japonica*, 3. *Corchorus japonicus*, 3. *Cyclamens*, 3. *Daisies*, fl. pl., 3. *Desfontainea spinosa*, tips kd., 3. *Escallonia macrantha*, 3. *Gaultheria procumbens*, 3. *Hydrangea*, 3. *Holly*, green, white and yellow vars., 3. *Laurel*, Bay, 3. *Laurel*, common, 3; Do. Portugal, 3. *Lonicera japonica*, kd. to grd., 2. *Mahonia aquifolia*, 3. *Menziesia alba*, 3. *Myrtle*, against a house, S.E. aspect, 15 yrs., leaves burnt, 3. *Verbena*, 3.

Plants uninjured—*Ajuga reptans rubra*, *Ampelopsis Veitchii*, *Anemones* (single and double scarlet and lilac), *A. japonica alba*, *Antirrhinum*, *Aquilegia cœrulea*, *Arabis* (variegated), *Artichoke* (globe, 4 out of 6), *Aubretia* (lilac), *Auriculas*, *Berberis Darwinii*, *Campanula* (small white), *Chimonanthus fragrans*, *Chrysanthemums*, *Clematis Jackmanni*, *C. montana*, *Cornus mascula variegata*, *Cotoneaster sieboldii*, *C.* (small leaved sp.), *Desfontainea spinosa*, *Deutzia scabra*, *Echeveria secunda glauca* (by S.W. wall), *Escallonia macrantha*, *Euonymus japonicus* (variegated), *Figs*, *Fuchsia gracilis* (?), generally dies to grd., *F. Riccartoni*, *F. Venus di Medici* (dies every winter to grd.), *Heartsease*, *Holly* (round-leaved, green), *Iberis* (perennial), *Jasmine*, *Juniper*, *Myosotis*, *Oxalis tropæoloides*, *Peaches*, *Pinks* and *Sweet Williams*, *Piptanthus*, *Primroses* (double and single), *Pyrus japonica*, *Thujas*, *Vegetables*, e.g. *Asparagus*, *Brussels sprouts*, *Cabbages*, *Celery*, *Horse-radish*, *Leeks*, *Parsley*, *Sage* and *Thyme*, *Weigela rosea*, *Yew* (Irish).

7. RAVEN-GLASS, Santon.—Mr. J. Gaitskell.

Gen. Char. of Soil—Various, but chiefly light and sandy.

Alt. and Exposure — 50 to 200 ft.; exposed, S. to W.; 4 ms., from the sea.

Rainfall, 1879—36·19 ins.

Date of Onset and Duration of Frost—Oct. 17th to April 30th; frost on 63 days.

Min. Temp. and Date — [Cartmel, dist., 21 ms., S.E.; alt., 100 ft.; Dec. 4th, 11°].

Plants injured, 1878-79 and 1879-80 — 7 (1), 17 (2), 9 (3) — *Abies Morinda*, 3. *Aucuba japonica*, 3. *Arbutus*, 2. *Arundinacea falcata*, 1. *Berberis Darwinii*, 2; *B. japonica*, 3. *Broussonetia papyrifera*, 2. *Camellias*, 1. *Caragana jubata*, 2. *Ceanothus*, 1. *Cercis siliquastrum*, 2. *Desfontainea spinosa*, 1, 2. *Elæagnus*, sorts, 3. *Ericas*, 2. *Escallonia*, 1. *Eugenia*, 2. *Euonymus jap. and vars.*, 2. *Garrya elliptica*, 2. *Griselinia littoralis*, 2. *Hibiscus syriacus*, 3. *Hydrangeas*, 2. *Laurel*, Bay, 3. *Laurustinus*, 2. *Pampas grass*, 1, 2. *Paulownia imperialis*, 2. *Pinus insignis*, 3. *Rhododendrons*, Sikkim, 2, 3. *Roses*, 1, 2, 3.

Plants uninjured—(Alt., from 300 to 350 ft.; sheltered from W. to N.E., by rising ground), *Arbutus*, *Berberis*, *Desfontainea spinosa* (5 ft. high, 18 ft. circ.), *Escallonia*, *Euonymus*, *Fabiana imbricata*, *Pampas grass*, *Veronicas*.—(Alt., 300 to 600 ft., and growing in the edge of hills with a S. aspect), *Conifers*, *Abies Douglasii*, *Araucaria*, *Cedrus Deodara*, *Cupressus Lawsoniana*, *C. macrocarpa*, *Picea amabilis*, *P. lasiocarpa*, *P. nobilis*, *Pinus excelsa*, *P. insignis*, *P. Lambertiana*, *Sequoia gigantea*, *Taxodium sempervirens*, *Thuja gigantea*.

Observations—In an exposed place, a *Pinus insignis* has made three times as much wood as, and is ten feet taller than, the *Birches*, *Scotch Firs*, *Larches*, *Oaks*, *Pinus austriaca*, and other trees planted at the same place and time.

1. DURHAM—DARLINGTON, Southend.—Mr. N. Black.

Gen. Char. of Soil—Very light with a gravel subsoil.

Alt. and Exposure—140 ft.; exposed to S.S.W.

Rainfall, 1879—22·18 ins.

Min. Temps. and Dates—Dec. 1st and 4th, -5° [Gainford, dist., 6 ms., W.; alt., 225 ft.; Dec. 3rd, -2°].

Plants injured, 1879-80—4 (1), 2 (2), 1 (3)—*Aucuba japonica*, 2. *Cedrus Deodara*, 1, 3. *Laurel*, Portugal, 1. *Laurustinus*, 2.

Quercus Ilex, 1. Roses, Dwfs., about 400 vars., 1.

2. FENCE HOUSES, Lambton Castle.—Mr. J. Hunter.

Gen. Char. of Soil—A heavy and retentive clay on quick sand.

Alt. and Exposure—15 ft.; exposed to N., E., and subject to E. winds; situate, 8 ms., from the sea.

Rainfall, 1879—23·49 ins.

Date of Onset and Duration of Frost—Nov. 12th to Dec. 27th.

Min. Temps. and Dates—Dec. 4th, -5°: [Chester-le-Street, dist., 2 ms., S.; Dec. 3rd, 10 p.m., 0°; 4th, 4 a.m., -6°; 5th, -5°: Durham, alt., 340 ft.; Dec. 4th, 4°·4].

Plants injured, 1879-80—24 (1), 17 (2), 11 (3)—Apples, 2, 3. *Araucaria imbricata*, 1, 2. *Aucubas*, 1. Box, 3. Broom, 1, 2, 3. *Cedrus Deodara*, 1, 2. *Cotoneaster*, sorts, 1, 2. *Cratægus Pyracantha*, 1, 2, 3. *Cryptomeria elegans*, 1, 2. *Cupressus Lawsoniana*, 1, 2. *Euonymus*, 1. *Garrya elliptica*, 1. *Genista*, 1. Hawthorn, 1, 2, 3. Holly, 1, 2, 3. Ivy, sorts, 1, 2, 3. Laurel, Bay, 1. Laurel, sorts, 1. *Laurustinus*, 1. *Magnolia*, 1. Oak, 1, 2, 3. Pears, 1, 2, 3. *Pinus Laricio*, 1, 2. Privet, 1, 2, 3. *Sequoia gigantea*, 1, 2. Yews, 75 p. c. kd., 1, 2, 3.

Observations—Broom, suffered less in proportion to exposure. Hollies, the silver and golden vars. stood better than the green. Pears, were full of vigour and suffered more than apples.

3. RYTON, Crowcrook.—Mr. W. Charlton.

Rainfall, 1879 — [Stamfordham, dist., 7 ms., N.; alt., 400 ft.; ht., 1 ft.; 27·04 ins.].

Min. Temps. and Dates — [Farnham, dist., 6 ms., E.; Dec. 4th, 2°: Bywell, dist., 6 ms., W.; Dec. 4th, 8°·5: Corbridge, dist., 9 ms., W.; alt., 270 ft.; Dec. 4th, -5°].

Plants injured, 1879—5 (1), 6 (2)—*Aucuba*, 2. Furze, in many places, 1. *Garrya elliptica*, kd. to grd., 2. Hollies, common and variegated, 30 to 40 ft., 2. Ivy, especially very large plants, nearly 100 yrs. old, 1. Laurel, Bay, large plants, 1. Laurels, common, 2; Do. Portugal, 2. Roses, 1, and kd. to grd., 2. *Sequoia gigantea*, large plant, 1.

Observations — Roses, had to be cut to the ground; except Gloire de Dijon and Maréchal Niel. The rest that survived were all H.Ps.

4. STOCKTON, Grindon.—Mr. W. Doxford.

Gen. Char. of Soil—Twelve inches of ordinary loam on a subsoil of clay (loose).

Alt. and Exposure—287 ft.; exposed on all sides.

Rainfall, 1879 — [Hartlepool, Hart Res., dist., 9 ms., E.; alt., 164 ft.; ht., 9 ins.; 21·71 ins., on 101 days].

Min. Temps. and Dates—[Darlington, dist., 9 ms., S.; alt., 140 ft.; Dec. 1st and 4th, -5°: Gainford, dist., 15 ms., S.E.; alt., 225 ft.; Dec. 3rd, -2°].

Plants injured, 1879-80—*Aucuba japonica*, 60 plants, kd. to grd., 2. *Laurustinus*, 80 plants, kd. to grd., 2.

Plants uninjured — *Araucaria imbricata*, *Cupressus Lawsoniana*, *Picea Nordmanniana*, *Thuja*s, *Deciduous trees*, *e.g.* *Beech*, *Elm*, *Oak* &c.

Observation — None of the *Aucubas* or *Laurustinus* were at all pruned.

5. SUNDERLAND, Whitburn Hall.—Mr. J. Dobson.

Gen. Char. of Soil—Light, on a subsoil of sand and clay combined, with limestone at an average depth of 10 ft.

Alt. and Exposure — About 100 ft.; 200 yds. from the beach, and situated on a promontary on the exposed N.E. coast, midway between the Tyne and Wear. The garden has the sea on three sides, N., E., and S.

Rainfall.—[Sunderland, alt., 120 ft.; ht., 6 ins.; 26·65 ins.].

Min. Temps. and Dates — [Dec. 4th ?] 6°: Sunderland, dist., 3 ms., E.; Dec. 4th, 9°: Lambton, dist., 8 ms., S.W.; alt., 15 ft.; 5°].

Plants injured, 1879—*Aucubas*, 2. Fruit trees, 1. *Holly*, 2. *Ivy*, *Irish*, on walls, 1. *Laurustinus*, 2. *Pampas grass*, 1. *Peaches*, 1. *Quercus Ilex*, 1.

Observations—Bedding plants often do well here, but the wet of 1879 being exceptionally great, for several weeks, we could not gather a flower. Vegetables, French beans, a total failure; Peas, never podded (sown last wk. of Ap. and last wk. of May); Celery, failure. The only evergreens that thrive on this exposed coast are *Aucubas*, *Portugal Laurels*, *Laurustinus*, and smooth-leaved *Hollies*. The first three were kd. to grd. or greatly injured by the frost in 1878-79. What little growth made in 1879 during that wet and sunless summer was little able to withstand the winter, 1879-80, which denuded them of leaves. Fruit trees, which always do badly, were in many instances killed; *e.g.* hardy Apples, Lord Suffield and Keswick codlin are the only sorts worth growing; Dessert Apples are hardly ever fit to eat. Pears stood better but were rarely eatable.

1. NORTHUMBERLAND—ALNWICK, The Castle.—Mr. A. Ingram.

Gen. Char. of Soil—Mostly light, of an av. depth of two ft.; on sand and gravel.

Alt. and Exposure—178 ft.; much exposed to N.W. winds.

Rainfall, 1879—33.36 ins., on 233 days.

Date of Onset and Duration of Frost—Nov. 27th, more or less to end of Jan.

Min. Temp. and Date—Dec. 3rd, -2° ; lower down by the river the temp. was much lower: [Belford,* dist., 12 ms., N.; [Dec. 4th ?], -16° : Fowberry,† nr. Belford, dist., 3 ms. from Wooler, on R. Till; Dec. 4th; ht., 2 ft.; -16° ; ht., 20 ft.; -7° : Cornhill, dist., 2 ms. fr. Coldstream; Dec. 4th, -4°].

Plants injured, 1879-80—4 (1), 14 (2), 6 (3)—Apples, tender sorts, 3. *Aucuba japonica*, 2. *Cercis siliquastrum*, 3. *Cotoneaster microphylla*, 2. *Cratægus Pyracantha cuneata*, 2. *Desfontainea spinosa*, 1. Furze, 1, 2. *Garrya elliptica*, 3. Holly, exposed, cut to grd., breaking again, 2. Laurel, Bay, 2. Laurel, common, 2; Do. Portugal, kd. to grd., 2. *Laurustinus*, 1. *Liquidambar styraciflua*, 2. *Magnolia*, 2. Nectarines, on walls, 2. Peaches, on walls, 2. Privet, 3. *Quercus Ilex*, some large trees. 1; others recovering, 2. *Rhododendron ponticum*, 3. Strawberries, 2. Yew, 3.

Plants uninjured—*Rhododendrons*, none of our large collection of Hybrids are in the least injured; I never saw them looking so well. Portugal Laurels on higher ground, unhurt.

Observations—Apples, I have not seen the Apple trees looking so well for many years, as they are this autumn (1880). Nectarines and Peaches, the young wood was all cut back, and in some cases large limbs were killed; but they have all made good wood this year and promise well for fruit in 1881.

2. HEXHAM, Bingfield.—Mr. J. Coppin.

Gen. Char. of Soil—Strong clay, on limestone.

Alt. and Exposure—445 ft.; exposed to N.

Rainfall, 1879—24.22 ins.

Date of Onset and Duration of Frost—Nov. 29th to Dec. 13th.

Min. Temps. and Dates—Dec. 4th, -10° [Hexham, Dec. 4th, -9° : Corbridge, alt., 270 ft.; dist., 6 ms. ?, E.; Dec. 4th, -5°].

Plants injured, 1879-80—5 (1), 3 (2), 4 (3)—Apples, 3. Ash,

* *Jl. of Hort.* 1879, p. 464.

† *Gard. Chron.* 1879, p. 765.

2. Berberis Darwinii, 2. Cotoneaster microphylla, 1. Currant, red, 3. Helianthemum roseum, 2. Hypericum calycinum, 2. Holly, 2; Do. silver, 2. Honeysuckle, 2. Laurel, common, 2; Do. Portugal, 2. Lime, 3. Menziesia polifolia, 1. Oak, 2. Pears, 3. Privet, 2. Rhododendron ponticum, 1. Roses, Stands., 1. Ruscus aculeatus, 1. Walnut, 2. Yew, 2.

3. WARK, Blindburn.—Mr. M. Hutchinson.

Gen. Char. of Soil—Gravelly.

Alt. and Exposure—About 400 ft.; near to the R. Tyne.

Rainfall, 1879—[Hesleyside, Bellingham, dist., 4 ms.; alt., 373 ft.; ht., 8 ins.; 31·05 ins., on 196 days].

Min. Temps. and Dates—Dec. 4th, -10°: [Bingfield, dist., 6 ms. ? S.; Dec. 6th, -10°].

Plants injured, 1879-80—6 (1), 4 (2), 1 (3)—Broom, 1. Clematis, 2. Furze, 1. Holly, 1. Ivy, 3. Laurel, common, 1; Do. Portugal, 2. Privet, 1. Roses, 2. Thyme, 1. Yew, 2.

1. WESTMORELAED—KENDAL, Bank House.—C. Wilkinson, Esq., J.P.

Gen. Char. of Soil—A good general garden soil, well dressed, though perhaps somewhat stiff (not allowing long carrots to grow without forming fingers).

Alt. and Exposure—About 500 ft.; exposed to N.E. and very little to S.; a portion facing S. and W.

Rainfall, 1879—[Kent Ter., alt., 146 ft.; ht., 1 ft. 6 ins.; 43·18 ins., on 179 days].

Min. Temps. and Dates—[Dec. 4th ?] 8°: Belfield, dist., 8 ms., N.W.; Dec. 4, -2°].

Plants injured, 1879-80 — 9 (1), 2 (2), 1 (3)—Berberis (American), 1. Cupressus Lawsoniana, 6 ft., 1. Greens, scarlet, 1. Holly, golden, 7 ft. high, 1. Jasminum, white, 2; and yellow, 7 yrs. old, 3. Laurel, common, about 8 yrs. old, 2. Parsley, 1. Pyrethrum, golden, 1. Rosemary, about 7 yrs. old, 1. Roses, two only, 1. Sage tree, 1.

Plants uninjured—Apples, Currants, Gooseberries, Pears, Plums and Raspberries. Herbaceous plants, all hardy perennials, except the scarlet Greens. Roses, all except the two above-mentioned.

Observations—The garden suffers generally from the E. winds in the spring which prevail from 3 to 6 or 7 weeks in April and May *without exception*. After these are over, it may be generally considered well adapted for flowers if the season be only rather dry, warm and with sunshine. Consequently it has looked gayer than I have ever seen it, owing to the late fine season.

2. BELFIELD, mid. of E. side of Lake Windermere.—H. W. Schneider, Esq.

Gen. Char. of Soil—Light and very porous, gravel and sand with slate rock below.

Alt. and Exposure—30 to 60 ft. above the lake; 160 to 190 ft. above the sea; exposed from S.W. to N.W.

Rainfall, 1879—55·35 ins.; max., July, 8·11 ins.; min., May, 1·84 ins.; av. of 10 yrs., about 55 ins.

Date of Onset and Duration of Frost—From Oct. 15th to March 31st; 108 days of frost.

Min. Temps. and Dates—Dec. 3rd, 1°; 4th, -2°; 5th, 0°; 6th, 6°; 7th, 1°; 8th, 6°.

Plants injured, 1879-80—1 (1), 3 (2), 2 (3)—Fruit trees, all kinds, 3. Roses, 2, 3. Sequoia gigantea, 2, 3. Vegetables, 1, 2, 3.

Plants uninjured—No injury to any tree of any moment, including Common and Portugal Laurels, Laurustinus and Rhododendrons.

Observations—Fruit trees, none were killed, but none of the young shoots ripened; hence there was no crop in 1880, but great vigour.

DIVISION XI.—ANGLESEA, WALES AND MONMOUTH.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM
ANGLESEA, N. AND S. WALES, AND MONMOUTH.

ANGLESEA. Jan. exceptionably dry; Aug. excessively wet; falls of 1 in. and upwards, 4 times in the month (Menaifron). *Rainfall*, 4·8 ins. above that of 1879 (Bodorgan). Min. rainfall, Holyhead, alt., 44 ft.; ht., 1 ft. 2 ins.; 33·87 ins., on 205 days: max., Bodorgan, alt., 20 to 30 ft.; ht., 4 ft.; 37·18 ins. *Min. temps.*, Bodorgan, alt., 20 to 30 ft.; Dec. 5th, 22°; Jan. 21st, 20°. In 1878-79, Dec. 14th, 12°; Jan. 11th, 17°: Holyhead, alt., 44 ft.; Dec. 4th and 5th, 28°.

N. WALES—CARNARVONSHIRE. The first qr., very dry; spring, very cold and dry; everything backward: summer, very wet and cold, with very little sunshine. *Rainfall*, in July was 12·19 ins. above av. Aut., cold and dry; hard frost in Nov. and Dec. (Bryn Gwynant). Min. rainfall, Llandudno, alt., 99 ft.; ht., 8 ins.; 29·36 ins., on 165 days: max., Beddgelert, alt., 264 ft.; ht., 3 ft.; 107·26 ins., on 194 days. *Min. temps.*, Forborth [alt., 100 ft. ?], [Jan. ?] 25th, 17°; 26th, 18°.

DENBIGH. A long-continued frost at beginning and end of year, with a cold, cloudy, dripping summer (Whynnstay). *Rainfall*, only ·06 in. above av. of 10 yrs.; June and Aug., extraordinarily wet, Oct., dry: min. rainfall, Trevalyn Hall, alt., 58 ft.; ht., 1 ft.; 29·33 ins., on 192 days: max., Cae Llwyd Res., alt., 918 ft.; ht., 9 ins.; 45·96 ins. *Temps.*, max. of year in shade, 79°·4; min., 11°·0 [Date ?]. Nant y Glyn, alt., 180 ft.; Dec. 4, 20°: Llandudno, alt., 79 ft.; Dec. 4th, 5th, 23°.

FLINT. *Rainfall* in June, July, Aug., excessive; small, in rest of year; total not above the average.

MERIONETH. A cold, wet, sunless year (Peniarth, Nannau Pk.). *Min. Rainfall*, Rüg Gardens, Corwen, alt., 500 ft.; ht., 1 ft.; 32·58 ins., on 157 days: max., Dolgelly, alt., 465 ft.; ht., 1 ft. 6 ins.; 64·31 ins. *Min. temps.*, Rüg, Jan. 23rd, 6°.

MONTGOMERY. *Min. Rainfall*, Mellington Hall, alt., 550 ft.; ht., 1 ft. 6 ins.; 28·80 ins., on 197 days: max., Lluest fawr, alt., 990 ft.; ht., 1 ft.; 53·80 ins. *Min. temp.*, Powis Castle, alt., 420 ft.; Dec. 3rd, 12°; Jan. 20th and 27th, 12°: Churchstoke, alt., 549 ft.; Dec. 2nd, 15°·2; Jan. 20th, 13°·2.

Plants injured (Anglesea and N. Wales), 1879-80 — 26 (1), 33 (2), 33 (3), total at 4 places.

S. WALES — CAERMARTHEN. Summer, very wet; winter, dry. Frost early, but lasting long and very severe (Llandovery). *Min. Rainfall*, Dynevor Castle, alt., 236 ft.; ht., 1 ft.; 47·03 ins., on 203 days: max., Narberth, alt., 158 ft.; ht., 1 ft.; 53·38 ins., on 191 days. *Min. temps.*, Caermarthen, alt., 188 ft.; Dec. 5th, 17°·9; Jan. 22nd, 15°·7.

CARDIGAN. *Min. Rainfall*, Gogerddan, alt., 80 ft.; ht., 1 ft.; 43·38 ins., on 202 days: max., Machynlleth, alt., 1380 ft.; ht., 1 ft.; 62·00 ins. *Min. temp.*, Gogerddan, alt., 80 ft.; Nov. 30th, 13°; Dec. 4th, 20°.

GLAMORGAN. Spring and summer, very wet; winter qrs., dry (Merthyr Tydfil). Greater part of Oct. and Nov. fine (Margam Pk.). *Min. rainfall*, Buttrill, alt., 250 ft.; ht., 1 ft.; 38·21 ins., on 121 days: max., Neath, alt., 240 ft.; ht., 1 ft.; 53·21 ins., on 210 days. *Min. temps.*, St. Fagan's Castle, alt., 100 ft.; Dec. 7th, 12°; Jan. 21st., 22°: Cardiff, alt., 43 ft.; Dec. 7th, 19°·2; Jan. 21st, 18°.

PEMBROKE. Spring very severe; summer cold and wet; Oct. and Nov., fine and very dry. *Min. rainfall*, St. Ann's Head, alt., 150 ft.; ht., 8 ins.; 34·45 ins., on 198 days: max., Narberth, ht., 52·61 ins., on 204 days. *Min. temps.*, Slebech, Dec. 5th and 7th, 7°: Haverfordwest, Dec. 5th, 11°; Jan. 21st, 15°·1: St. David's, alt., 189 ft.; Dec. 4th, 21°·6: St. Ann's Head, alt., 150 ft.; Dec. 4th and 5th, 26°.

Plants injured (S. Wales), 1879-80—45 (1), 57 (2), 41 (3), total at 6 places.

MONMOUTH. Very low temp., all the year, excepting one week. *Rainfall*, heavy in earlier months; Oct. and Nov., dry. *Min. rainfall*, Dingestow Court, alt., 250 ? ft.; ht., 1 ft.; 31·82 ins.: max., Ebbw Vale, alt., 918 ft.; ht., 1 ft.; 63·70 ins., on 218 days. *Min. temp.*, Llanfrehfa, alt., 320 ft.; Dec. 27th, 20°.

REPORTS.

1. ANGLESEA—LLANGFIN, Bodorgan.—Mr. Jas. Ellam.

Gen. Char. of Soil—An ordinary loam.

Alt. and Exposure — Partly, 20 to 30 ft.; partly, 100 to 120 ft.

Rainfall, 1878—32·38 ins.; 1878-79—37·18 ins.

Date of Onset and Duration of Frost—1878-79, Dec. 2nd to 25th, and Jan. 2nd to 11th: 1879-80, Dec. 1st to 13th and Jan. 19th to 27th; with short intervals of a day or two of thaw.

Min. Temps. and Dates—1878-79, Dec. 14th, 12°; Jan. 17th, 17°: 1879-80, Dec. 5th, 22°; Jan. 21st, 20°.

Plants injured, 1878-79 and 1879-80 — 11 (1), 13 (2), 19 (3)—*Aloysia citriodora*, 10 to 12 ft. high, on walls, 1878-79, 1; and kd. to grd., 2: 1879-80, 3. *Aralia Sieboldii*, 78 and 79, 3. *Aucuba japonica*, sorts, in low, damp places, 78, 2; 79, 3; on dry, elevated grd., 78, 3. *Azalea indica*, 12 to 14 yrs. old, in cold damp grd., 78, 3. *Bambusa Fortunei*, vars., 78, 3. *Camellias*, in open grd., flr. buds kd., 78 and 79, 3. *Ceanothus*, sorts, on wall, 78, 3. *Cineraria acanthifolia* and *C. maritima*, 78 and 79, 1, 2. *Clanthus puniceus*, 8 to 10 yrs. old, large plant, on wall, 78, 1. *Coronilla glauca*, on wall, 78, 1. *Eriobotrya japonica*, on wall, 78 and 79, 3. *Escalonia macrantha*, in open, 78, 2; 79, 3; *E. rubra*, do., 78, 79, 2, 3. *Eugenia Ugni*, in open, on wall, 78, 3. *Eucalyptus globulus*, 18 to 20 ft. high, 30 ins. girth, 7 yrs. old, 78, 1. *Euonymus*, 5 or 6 sorts, in low damp places, 78, 1, 2; 79, 2, 3. *Farfugium grande*, 78 and 79, 1, 2. *Hydrangeas*, 78, 2; 79, 3. *Laurel*, Bay, in damp places, 78, 2; 79, 3. *Laurustinus*, in damp places, 78 and 79, 2, 3. *Magnolia grandiflora*, on walls, 78, 3. *Myrtles*, in dry places, lost foliage, on walls, 78, 2; 79, 3; in low damp places, 78, 1; kd. to grd., but recovered, 2. *Passiflora cœrulea*, covered a large space for 8 or 9 yrs., on walls, 78, 1. *Solanum jasminoides*, on wall, 78, 1. *Veronicas*, in damp places, 78 and 79, 1; in dry places, 78 and 79, 2, 3.

Plants uninjured, 1878-79 and 1879-80—American (Nth.) Plants, 78, 79; *Arbutus*, 78, 79; *Aucuba*, on dry elevated grd., 79; *Azalea indica*, in open, 79; *Azara microphylla*, on wall, 78, 79; *Berberidopsis corallina*, on walls, 78, 79; *Buddlea globosa*, 79; *Centaureas*,

78, 79; *Chamærops excelsa*, 10 ft. high, 78, 79; *Choisya ternata*, on wall, a grand old plant, 78, 79; Conifers of all kinds (including *Araucarias*, *Cedrus Deodara*, and *Pinus insignis*), 78, 79; *Desfontainea*, on walls, 78, 79; *Escallonia macrantha*, on walls, 78, 79; *Eugenia Ugni*, in open, 79; *Euonymus*, 5 or 6 sorts, on walls and in elevated dry places, 78, 79; *Eurya latifolia*, variegated, 78, 79; *Forsythia viridissima*, 78, 79; *Fremontia californica*, on wall, 78, 79; Japanese shrubs, *e.g.* *Osmanthus*, 79; *Magnolia grandiflora*, 79. Myrtles, some plants, in dry positions, 78, 79. *Veronica salicifolia*, and *S. devoniana*, 78, 79. *Yucca filamentosa*, *Y. flaccida*, and *Y. gloriosa*, 78, 79.

Observations—The injury done to shrubs and plants at this place in the winter, 1879-80, was so much less than in the previous winter, that I have given the results of the frosts in both winters. I fear the results of the late severe and continued frosts will be as in 1878-9, as I find plants are injured which were unhurt two years ago. The climate of Anglesea is generally mild and we do not have such extremes of heat or cold as occur in the more inland situations. We have Indian Azaleas, 14, Camellias nearly 20, and Myrtles which must be 40 years old. Bedding plants, as *Calceolarias* and *Pelargoniums* stand out blooming for three summers in succession, without any winter protection. On the banks of the Menai Straits, opposite Bangor, half-hardy plants stand much better than at this place. (Feb. 4th, 1881).

1. N. WALES—CARNARVON, Bangor, Treborth Park. — Mr. J. Fitzpatrick.

Gen. Char. of Soil—Heavy and clayey.

Alt. and Exposure — Situate on an eminence between the tubular and suspension bridges, near the sea, and very much exposed at all points, but especially to E., N. and S.

Rainfall, 1879 — [Carnarvon, dist., 7 ms., S.; alt., 120 ft.; ht., 1 ft. 1 in.; 38·87 ins., on 199 days].

Date of Onset and Duration of Frost—Nov. [Dec. ?] 11th, 27°; 12th, 28°; 13th, 26°; 14th, 22°; 15th, 29°: Frost returned [Jan. ?] 22nd, 28°; 23rd, 26°; 24th, 23°; 25th, 17°; 26th, 18°; 27th, 22°; 28th, 21°; 29th, 27°; 30th, 24° [Bodorgan, dist., 10 ms., W.; Dec. 1st to 13th; and from Jan. 19th to 27th.]

Min. Temps. and Dates—[Dec. ?] 14th, 22°; [Jan. ?] 25th, 17°,

and 26th, 18° [Llandudno, dist., 15 ms., N.W.; alt., 79 ft.; Dec. 2nd, 25°·5; 4th and 5th, 23°; Jan. 21st, 24°·2: Colwyn Bay, dist., 8 ms., E.; alt., 180 ft.; Dec. 4th, 20°].

Plants injured, 1879—None.

Plants uninjured—*Ceanothus Veitchii*, *Escallonia macrantha*, *Garrya elliptica* and a Gloire de Dijon Rose growing on a N.E. wall had no other protection than some litter about the roots. Similarly, *Chorozema ilicifolia* and *Lapagerea rosea* grown as creepers up the glass in a cold lean-to house with N. aspect were uninjured.

1. DENBIGH—ABERGELE, Hafodunos.—Mr. J. McNair.

Gen. Char. of Soil—A rich clayey loam, resting on rotten whinstone; some parts light and friable.

Alt. and Exposure—750 ft.

Rainfall, 1879—[Garthewin, alt., 363 ft.; ht., 1 ft.; 36·85 ins., on 146 days].

Min. Temps. and Dates—[Nant-y-Glyn, dist., 5 ms.?, W.; alt., 180 ft.; Dec. 4th, 20°: Llandudno, dist., 10 ms., W.; alt., 79 ft.; Dec. 4th and 5th, 23°; Jan. 21st, 24°·2].

Plants injured, 1879-80—10 (1), 19 (2), 13 (3) — *Abies Morinda*, 3. *Aralia spinosa*, 1. *Araucaria imbricata*, 1, 2; on higher grd., 3. *Berberis Darwinii*, 1, 2. Broccoli, 1. Brussels sprouts, 1. Cabbages, Savoys, 2. *Ceanothus azureus*, on wall, 1. *Cedrus Deodara*, 3; *C. D. robusta*, 3. Celery, 2. *Cephalotaxus Fortunei*, 2. *Desfontainea spinosa*, 1. *Escallonia macrantha*, on wall, 1; *E. pteroclados*, 1. *Euonymus japonicus*, variegatus, on wall, 2. *Fitzroya patagonica*, 3. *Garrya elliptica*, 2. *Gunnera scabra*, 2. Holly, 3; *Do. latifolium*, 2. *Jasminum Reevesii*, on wall, 1. *Kalmia latifolia*, 3. Laurel, common, 2; *Do. Portugal*, 3. *Laurustinus*, 2. *Magnolia grandiflora*, 2. Pampas grass, 2. *Pernettya*, sp., 3. *Picea bracteata*, 3; *P. Webbiana*, 2. *Pinus insignis*, 1. *Prumnopitys elegans*, 2. *Quercus glabra*, 2; *Q. Ilex*, 3. Rhododendrons, 3. Roses, Banksian, 1; others, 2. *Salisburia*, 3. *Skimmia japonica*, 2. *Tritoma uvaria*, 2.

Plants uninjured—*Picea Webbiana*, the finest specimen.

2. COLWYN, Nant-y-Glyn.—Mr. A. O. Walker, F.L.S., F.M.S.

Gen. Char. of Soil—Stony, mostly of decomposed Wenlock shale, which is near the surface in many parts of the garden.

Alt. and Exposure—180 ft., half a mile from the sea, on the side of a valley sloping to E.S.E., the valley running N.N.E. to the sea.

Rainfall, 1879 — 1st qr., 5·49 ins. ; 2nd qr., 7·34 ins. ; 3rd qr., 13·40 ins. ; 4th qr., 3·97 ins. ; total, 30·20 ins.

Date of Onset and Duration of Frost—Dec. 2nd to 7th.

Min. Temp. and Date—Dec. 4th, 20°.

Plants injured, 1879-80—None.

Plants uninjured—*Callisthemon lanceolatum*,* *Cordyline australis*,* *Dodonaea ericæfolia*,* *Eryngium pandanifolium*,* *Escallonia macrantha*,* *Eucalyptus coriaceus** (?), *E. Gunnii*, *Eugenia apiculata*,* *Fabiana imbricata*, *Fremontia californica*,* *Leptospermum scoparium*, *Photinia serrulata*,* *Pittosporum tenuifolium*.

Observations—The winter 1879-80 was so much less severe than that of 1878-79 that it cannot be said that anything that was left alive in the spring of 1879 was injured, notwithstanding the very heavy rainfall in the summer of 1879. Those plants in the foregoing list marked * were injured in 1878-79, when many trees and shrubs were killed, but not in 1879-80. The effects of the heavy summer rainfall were chiefly shown in the miserably deficient crop in 1880 of all fruit trees, excepting Cherries. There were no Peaches or Nectarines, very few Apricots or Plums, and, speaking broadly, no Apples or Pears, excepting five never failing varieties, *viz.* Dutch Mignonne, Lord Suffield, Mannington's Pearmain, Ribston Pippin, and Sturmer Pippin. On Espaliers, there were a few of Gansel's Bergamot Glou Morceau, Louise Bonne, and Marie Louise, on S.E. walls.

1. MERIONETH—CORWEN, Rüg.—Mr. Jas. Bennett.

Gen. Char. of Soil—Very light ; subsoil, gravel.

Alt. and Exposure—500 ft. ; exposed to E.

Rainfall, 1879—32·58 ins., on 157 days.

Date of Onset and Duration of Frost—End of Nov. to Feb.

Min. Temp. and Date—Jan. 23rd, 6°.

Plants injured, 1879-80 — *Araucaria imbricata*, 2. Artichoke, globe, 1. Broccoli, 1. Laurel, common, 3.

Observation—None but the most hardy shrubs are grown here.

1. MONTGOMERY—WELSHPOOL, Powis Castle.—Mr. W. Lee.

Gen. Char. of Soil—A stiff red loam, on red rock.

Alt. and Exposure—420 ft. ; exposed to S. and E.

Rainfall, 1879—33·8 ins.

Date of Onset and Duration of Frost—Oct. 16th, 23°, to Dec. 26th; Jan. 18th, 23°, to Feb. 22nd; March 18th to May 2nd, 24°.

Min. Temps. and Dates—Dec. 3rd, Jan. 20th and 27th, 12°: [Churchstoke, dist., 7 ms., S.E.; alt., 549 ft.; Dec. 2nd, 15°·2; Jan. 20th, 13°·2].

Plants injured, 1879-80—Vegetables alone suffered very severely; the garden being exposed to the E. winds, Broccolis, Cabbages, and Greens were all killed.

Plants uninjured—Conifers, choice kinds, and deciduous trees and shrubs very much exposed, such as Araucarias, Abies, sp., Biotas, Cedrus, sp., Cryptomeria, Cupressus, sp., Retinosporas, &c.; Flowers and Herbaceous plants, none have suffered; *Lapageria rosea*, planted agst. S.E. wall, on June 1st, 1879, bore fine flrs. in Sept.; made excellent growth, 1880; and would have fld. in Oct. had not frost set in so early (with 23°) and continued throughout the month.

1. S. WALES—CAERMARTHEN, Whitland, Maesgwynne.—Mr. T. Higgins.

Gen. Char. of Soil—A loamy clay on a cold subsoil of clayey marl.

Alt. and Exposure—About 200 ft.; exposed to wind from the Irish Channel.

Rainfall, 1879 — [Caermarthen, dist., 12 ms., E.; alt., 92 ft.; ht., 6 ins.; 50·12 ins., on 225 days].

Min. Temps. and Dates—[Caermarthen, alt., 188 ft.; Dec. 5th, 17°·9; Jan. 22nd, 15°·7: Haverfordwest, dist., 15 ms., W.; alt., 95 ft. (?); Dec. 5th, 11°; Jan. 21st, 15°·1].

Plants injured, 1879-80—3 (1), 7 (2), 4 (3)—Apples, 2. *Aralia Sieboldii*, 1. *Asparagus*, 50 p. c., 1, others 2. *Aucuba japonica*, 2. *Hydrangeas*, 1. *Laurustinus*, exposed, 2; sheltered, 3. Peaches, 2. Pears, 2. *Rhododendron ponticum*, 3; *R. hybs.*, 3. Vegetables, all kinds, 3. *Veronicas*, 2.

Plants uninjured—Broccoli, in most exposed part of garden, walled on all sides, finest crop; Cabbages, all sorts stood well; Cherries, av. crop, 1880; Confers, not one injured; Currants, av. crop, 1880; Gooseberries, never better crop, bushes laden to grd., 1880.

Observations—Apples, Peaches and Pears bore no fruit in 1880: the summer growth dying back, 3 to 5 ins., to the more matured

wood; foliage in Dec. Aucubas, striking strongly again from the roots. Hydrangeas, fine plants, 10 yrs. old, much injured in 1878-79, killed in 1879-80. Rhododendrons, the wood did not ripen, flowers very poor in 1880.

1. CARDIGAN—ABERYSTWITH, Gogerddan.—Mr. T. Vearly.

Gen. Char. of Soil—Brashy, on gravel.

Alt. and Exposure—50 ft.; exposed to E. and W.

Rainfall, 1879—[Alt., 80 ft.; ht., 1 ft.; 43·38 ins., on 202 days].

Date of Onset and Duration of Frost—Nov. 1st, and continued nearly the whole of three months.

Min. Temps. and Dates—Nov. 30th, 19°; Dec. 4th, 21°; Jan. 20th and 26th, 21°; [alt., 45 ft.; Dec. 4th, 20°].

Plants injured, 1879-80 — 3 (1), 11 (2), 8 (3) — Artichoke, globe, 2. Aucuba japonica, 3. Borecole, 3. Broccoli, 2. Buddlea globosa, 2. Cabbages, 3. Cryptomeria elegans, 3. Daisies, double, 2. Escallonia, sorts, 2. Eucalyptus globulus, 1. Euonymus, sorts, 3. Laurustinus, 2. Onions, winter, 2. Retinosporas, 3. Roses, 3. Sage, 1. Sequoia gigantea, 3. Spinach, 2. Stock, Brompton, 2. Thyme, 2. Violets, 2. Wallflowers, 1.

2. ABERYSTWITH, Llanilar.—Mr. J. Loxdale.

Gen. Char. of Soil—A strong alluvial clay, in part; other part, a poor shaley loam, close upon the rock.

Alt. and Exposure—[About 70 ft.?: Aberystwith, dist., 5 ms.; alt., 45 ft.] N.W. aspect.

Min. Temp. and Date—[Aberystwith, alt., 45 ft.; Dec. 4th, 20°].

Plants injured, 1879-80 — 8 (1), 5 (2), 0 (3)—Agapanthus, 2. Arbutus, 2. Artichoke [globe?], 1. Aucuba japonica, 2. Broccoli, every sort, 1. Escallonia, 1. Laurustinus, 2. Oenothera macrocarpa, roots unprotected, 1. Pentemons, 1. Rhododendrons, esp. choicer kinds, 2. Statice latifolia, roots unprotected, 1. Thyme, 1. Veronica (purple &c.), all (excepting white), 1.

1. GLAMORGAN—CARDIFF, St. Fagan's Castle.—Mr. R. Crossling.

Gen. Char. of Soil—Shallow, composed of the debris of red limestone.

Alt. and Exposure—100 ft.; fully exposed to the gales from S.W.; but sheltered on N. and E.

Rainfall, 1879—[Cardiff, dist., 2 ms.; Cemetery, alt., 95 ft.; ht., 1 ft.; 46·34 ins., on 210 days].

Date of Onset and Duration of Frost—Nov. 14th to 16th severe; ending Feb. 4th, excepting 17 days of thaw.

Min. Temps. and Dates—Dec. 7th, Jan. 21st and 22nd, 12° [20°?]: [Cardiff, dist., 3 ms.; alt., 43 ft.; Dec. 7th, 19°·2; Jan. 21st, 18°: Llanfrechfa, dist., 14 ms., N.E.; alt., 320 ft.; Dec. 7th, 20°].

Plants injured, 1879-80—23 (1), 13 (2), 16 (3)—*Agave americana*, 1. *Aloysia citriodora*, 1. *Aralia Sieboldii*, 3; *A. S. variegata*, 1. *Arundo conspicua*, 3. *Asparagus*, 2. *Berberidopsis corallina*, 1. *Bignonia*, 1. *Camellias*, 1, 2, 3. *Ceanothus dentatus*, all, 1. *Cercis siliquastrum*, 1. *Chamærops Fortunei*, 1. *Clianthus puniceus*, 1. *Coronilla glauca*, 1. *Cytisus ramosus*, both large and small, all, 1. *Euonymus*, vars., 1, 2, 3. Figs, unprotected, by early frosts, 3. *Fuchsia Riccartoni*, 3. *Hybiscus syriacus*, var., 3. *Hydrangeas*, pts. kd., no bloom, 1880, 3. Laurel, Bay, 2, 3. *Laurustinus*, 2, 3. *Magnolia grandiflora*, on walls, 3. Myrtles, in open, 1; on walls, 2. *Paliurus aculeatus*, 1. Pampas grass, 2. *Passiflora cœrulea*, 1. Peaches, 3. *Pinus Llaveana*, 1; *P. pinea*, 1, 2. *Pittosporum Tobira*, 1. *Punica Granatum*, fl. pl., 2. Roses, Dwf. Teas, 3; Stands., 1, 2, 3. Raspberries, 1, 2. *Salix babylonica*, 1. *Statice latifolia*, 2. Vines, wood not ripened, on walls, 3. *Yucca gloriosa*, individs., 1, 2, 3.

Plants uninjured—*Arundo Donax*; *Planes* and *Raphiolepis ovata*, exposed to W. and N.; *Sedum Sieboldii*, *variegatum*; *Selaginella denticulata*; *Yucca gloriosa*, a few.

Observations—Much of the injury must be attributed to the unripe state of the wood. We experienced more frost in the previous winter of 1878-79; but our *Hydrangeas* were finer than usual after it. This summer we had no bloom, all the points being killed. This is one instance amongst many.

2. ST. FAGAN'S—[Report in *Jl. of Hort.* 1880, p. 276].

Min. Temp. and Date—Dec. 4th, 20°.

Plants injured, 1879-80—Apricots, weak, 3. Broccoli, two-thirds, 1. *Euonymus*, variegated, all, 1. Figs, 2. Herbaceous plants, all, 1. Myrtles, several, 20 yrs. old, not protected, by walls, 1. Peaches, weakened, 3. Pears, no frt. buds, 3. *Pittosporum Tobira*, a fine plant, 8 ft. by 7 ft., 1. Raspberries, cut back, a few to grd., 2. Roses, Stands., 24, 1; many, 2; Teas, breaking from bottom, 2.

Plants uninjured—Broccoli, one-third saved. Fruit trees, well set with bloom-buds! (Pears excepted). Roses, 500 dwf. H. P.'s; newer H. P.'s, removed out of pots in the aut. in good condition; e.g., A. K. Williams, Countess of Roseberry, Duchess of Bedford, and Souvenir de V. Verdier.

Observations—In many cases the injuries received in the winter were not very conspicuous until the E. winds of spring detected them. In the case of the newer H. P. roses, perhaps the restricted growth of the plants in pots, which would have a better chance of ripening in such a season as the last, would account for any noticeable differences, rather than special hardiness in the varieties.

1. PEMBROKE—LLECHRYD, Castle Malgwyn.—Mr. H. Howard.

Gen. Char. of Soil—Cold, a clay subsoil.

Alt. and Exposure—Less than 100 ft.; sheltered well on E. W. and N.; but open to S. and S.W.

Rainfall, 1879—Ht., 1 ft.; 40·18 ins., on 206 days.

Date of Onset and Duration of Frost—Dec. 1st, and lasted the greater part of the month; Jan. 17th, and lasted 11 days.

Min. Temps. and Dates—Dec. 1st, 8°: [Slebech Pk., dist., 20 ms., S.; Dec. 5th and 7th, 7°.]

Plants injured, 1879-80—3 (1), 12 (2), 3 (3)—Arbutus, sorts, 2. Arundo conspicua, 3. Cedrus Deodara, an avenue much disfigured, 2. Escallonia macrantha, 1. Euonymus japonicus, recovered, 2. Figs, large trees, kd. to grd., 2. Furze, 2. Garrya elliptica, 1. Hydrangea japonica, 2. Juniperus, weeping var., 2. Laurel, Bay, 2. Laurel, common, many large plants, kd. to grd., 2. Laurustinus, 2. Lonicera brachypoda, aureo-reticulata, 2. Pampas grass, 2. Quercus Ilex, one large tree, over 20 ft., 1; others, 2. Rhododendrons, pts. of shoots kd., 3. Yucca, stems frozen through in some, 2, 3.

2. NARBERTH, Slebech Park.—Mr. G. Griffin.

Gen. Char. of Soil—A good loam with a clay subsoil.

Alt. and Exposure—Only a few feet above sea-level; on the banks of a tidal river, 20 miles inland; exposed to Atlantic winds.

Rainfall, 1879—Excessive during the summer, followed by a dry winter: [Haverfordwest, dist., 9 ms., W.; alt., 95 ft.; ht., 1 ft.; 49·69 ins., on 177 days].

Date of Onset and Duration of Frost—Nov. 2nd (25·5), till Dec.

22nd, with deep snow; Jan. 19th till 28th, with slight frosts at intervals, during the remainder of the winter.

Min. Temps. and Dates—Dec. 5th and Jan. 22nd, 7°: [Caermarthen, dist., 24 ms., E.; alt., 188 ft.; Dec. 5th, 17°·9; Jan. 22nd, 15°·7; Haverfordwest, dist., 7 ms., W.; Dec. 5th, 11°; Jan. 21st, 15°·1].

Plants injured, 1879-80—5 (1), 9 (2), 10 (3)—*Aralia Sieboldii*, 2. *Aucuba japonica*, 3. *Berberis Darwinii*, where shaded, 2; *B. vulgaris*, 3. Blackberry, used as cover in woods, 1. Broccoli, 2. Camellias, 2. *Cedrus Deodara*, 2. *Escallonia rubra*, 3. Figs, 2. Furze, all the old plants, esp. in damp places, 1. *Gleditschia triacanthos*, 3. Larch, young plantations, 2; old, 3. Laurel, Bay, breaking again strongly, 2. Laurel, common, 3. *Laurustinus*, 1. *Ligustrum vulgare*, ovalifolium, 3. *Mahonia Bealii*, 1. *Myrtus communis*, latifolia and microphylla, 2. *Olea ilicifolia*, 3. *Quercus Ilex*, young plants near or under trees, 3. *Raphiolepis ovata*, 3. *Sequoia gigantea*, in shade, 1.

Plants uninjured—*Azara microphylla*, *Berberis stenophylla*, Camellias (near coast), *Cistus ladaniferus*, *Coniferae*—*Abies Douglasii*, *Araucaria imbricata*, *Cedrus atlantica*, *C. Deodara* (a few of the slowest growing and handsomest specimens), *C. Libani*, *Cryptomeria japonica*, *Cupressus Lawsoniana*, *C. Lambertiana*, *C. nutkaensis*, *Juniperus Bedfordiana*, *J. chinensis*, *Picea nobilis*, *P. Nordmanniana*, *P. excelsa* and others, *Retinospora obtusa*, *R. plumosa*, *R. squarrosa* and others, *Sequoia gigantea* (in exposed places, very healthy), *Thuja occidentalis* and several others,—*Daphne collina*, Figs (near the sea), *Griselinia littoralis*, *Ligustrum japonicum*, *Olearia Haastii*, *Pæonia moutan*, *Quercus Ilex* (young and old trees where fully exposed to sun and air), Vegetables (excepting Broccoli) fairly good.

Observations—Trees and shrubs which are planted in a deep rich soil make very succulent growth, which does not ripen in a cold wet summer like that of 1879; consequently they are killed by the frost. Those planted in full sun are extremely healthy. The destruction of young Larches appears to be the greatest loss sustained in this district; upwards of a million having been killed in the neighbourhood. Taken as a whole the ornamental plantations and pleasure grounds in this district have not suffered much, in fact, very little.

DIVISION XII.—(SCOTLAND) S. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM DUMFRIES, KIRKCUDBRIGHT AND ROXBURGH.

DUMFRIES. *Rainfall*, greatly below av. (Dumfries). Min. rainfall, Dumfries, alt., 159 ft.; ht., 6 ins.; 33·31 ins., on 164 days: max., Langholm, alt., 450 ft.; ht., 3 ins.; 50·20 ins. *Min. temps.*, Drumlanrig, alt., 191 ft.; Dec. 6th, 1°: Langholm, alt., 500 ft.; and Lockerbie, alt., 196 ft.; Dec. 4th, 4°: Dumfries, alt., 159 ft.; Dec. 4th and 6th, 8°.

Plants injured, 1879-80 — 21 (1), 13 (2), 6 (3), total at 2 places.

KIRKCUDBRIGHT. *Rainfall*, first five and last three months, very deficient; but greatly above av. in June, July, Aug., and Sept. Min. rainfall, Little Ross, alt., 130 ? ft.; ht., 3 ft. 3 in.; 25·84 ins.: max., Carsphairn, alt., 574 ft.; ht., 3 ft. 10 ins.; 50·24 ins., on 149 days. *Min. temp.*, Cally, alt., 140 ft.; Dec. 4th, 14°.

Plants injured, 1879-80—4 (1), 1 (2), 1 (3), total at 1 place.

ROXBURGH. Winter (1878-79) late and severe; *Rainfall*, great in summer; harvest late, extending to 2nd week in Nov.; Nov., remarkably fine; early part of Dec., excessively cold (Teviothead Manse). Min. rainfall, Kelso, alt., 130 ft.; ht., 1 ft.; 24·92 ins., on 219 days: max., Teviothead Manse, alt., 550 ft.; ht., 9 ins.; 45·70 ins., on 173 days. *Min. temps.*, Dec. 4th, Crailing and Ormiston,* -18°: Kelso, four obs., -18°, -16°, -14°, and -12°: Nr. R. Teviot,* -16°: Ancrum (Kirklands)* -12°: Jedburgh, alt., 273 ft.; -13°: Mt. Teviot,* -13°: St. Boswell's, alt., 230 ft.; Dec. 10th, -12°: Ancrum House, -12°: Melrose, alt., 280 ft.; Dec. 7th, -5°: Wolfelee, alt., 601 ft.; -5°: Lilliesleaf, alt., 510 ft.; -4°: Hawick (Silverbut Hall), 0°.

Plants injured, 1879-80 — 61 (1), 74 (2), 5 (3), total at 4 places.

* *Gard. Chron.* 1879, Vol. xii. p. 796.

REPORTS.

1. DUMFRIES—LANGHOLM, Arkleton.—Mr. J. Dickson.

Gen. Char. of Soil—Light and gravelly.

Alt. and Exposure—500 ft.; exposed to S.W.

Rainfall, 1879—50·20 ins.

Date of Onset and Duration of Frost—In 1879, July was the only month without a frost. Sept. 21st and Oct. 7th, 27°; Nov. 21st, 4 ins. of snow; on 24th, 29th and 30th, 21°; Dec. 1st, 21°; 2nd, 11°; 3rd, 12°; 4th, 4°; 5th, 6°; 6th, 12°; 7th, 21°.

Min. Temps. and Dates—Dec. 4th, 4°: [Dumfries, dist., 23 ms., S.W.; alt., 159 ft.; Dec. 4th, 6th, 8°].

Plants injured, 1879-80—11 (1), 9 (2), 3 (3)—Borecole, tall curled or Scotch and Dwf. curled or Canada, 1. Brussels sprouts, 1. Cedrus Libani, 2. Cotoneaster microphylla, 2; C. Simmonsii, 2. Crataegus Pyracantha, 2. Escallonia macrantha, 2. Garrya elliptica, 2. Laurel, Bay, 1, 2. Laurel, Portugal, 1, 2. Lonicera brachypoda, aureo-reticulata, 3. Onions, aut. sown, 1. Phormium tenax, 1. Rhododendrons, buds kd., 3. Roses, 1, 2. Sequoia gigantea, 18ft. high and 17 yrs. old, 1. Spartium junceum, 1. Strawberry plants, by early cold frosty winds, 1. Tritoma uvaria, 1; Do. grandiflora, 1. Yews, 3.

Observation—Roses, fully one-half were killed, though in the previous winter, which was more severe (min. temp., Dec. 13th, 1878, -2°), we did not lose one.

2. LOCKERBIE, Jardine Hall.—Sir A. Jardine, Bart.

Gen. Char. of Soil—Light.

Alt. and Exposure—196 ft.; open and exposed.

Date of Onset and Duration of Frost—Nov. 28th to Dec. 22nd.

Min. Temps. and Dates—Dec. 4th, 4°: [Drumlanrig, dist., 6 ms., W.; alt., 191 ft.; Dec. 6th, 1°].

Plants injured, 1879-80—10 (1), 4 (2), 3 (3)—Abies Douglasii, 3 or 4 yrs. old, 1878-79 and 1879-80, 2. Araucaria imbricata, 78, 2; 79, 1. Aucuba japonica, 78, 2; 79, 1. Broccoli, 78 and 79, 1. Cedrus Deodara, 78, 2; 79, 1. Cotoneaster, 78, 1. Cryptomeria japonica, 78 and 79, 3. Figs, on open wall, 79, 1. Forsythia elegans, on wall, 78, 3; 79, 1. Holly, golden &c., lost foliage, 78 and

79, 3. Ivy, 78 and 79, 3. Laurel, Bay, 78, 2; 79, 1, 2. Laurel, Portugal, 78, 2; 79, 1, 2. Phormium tenax, 78, 1. Rhododendron ponticum, 78, 3; 79, 1, 2. Sequoia gigantea, 78, 3. Vegetables, all winter sorts, 78 and 79, 1.

1. KIRKCUDBRIGHT — AUCHENCAIRN, Castle Douglas. — Mr. J. McGuffey.

Gen. Char. of Soil—A hazel loan on a gravel subsoil.

Alt. and Exposure—50 ft.; exposed to S.E.

Rainfall, 1879—43.28 ins.

Date of Onset and Duration of Frost—Oct. 15th, 32°; all tender plants cut; Nov. 4th, 13th, 15th, 22nd and 29th, slight frosts; Dec. 1st to 9th, keen frosts, also on 11th and 20th; Jan. 12th to 22nd, keen frosts.

Min. Temps. and Dates—[Dec. 4th (?) about 10° (?): Sillioth, dist., 18 ms., E.; Dec. 4th, 8°; 5th, 9°·2: Dumfries, dist., 18 ms., N.E.; alt., 159 ft.; Dec. 4th, 6th, 8°: Cally, dist., 11 ms., W.; alt., 140 ft.; Dec. 4th, 14°].

Plants injured, 1879-80—4 (1), 1 (2), 1 (3)—Antirrhinum, 1. Artichoke, globe, 1. Aucuba japonica, 3. Penstemons, 1. Roses, dwfs., 2. Tritoma uvaria, 1.

Observations—Fruit crops (1880), Apples on stands and walls, a fair crop. Barberry, none. Cherries, on stands, none; on walls, a good crop. Currants, black, very poor; red and white, good crops. Gooseberries, a good crop. Nuts, in woods, none. Oaks bore no acorns. Pears, on stands, none. Plums, on stands, none; on walls, very poor crop.

1. ROXBURGH—JEDBURGH, Mt. Teviot.—Mr. J. Page.

Gen. Char. of Soil—Light, principally on gravel and “till.”

Alt. and Exposure—About 273 ft.; exposed to E. and S.W. gales; situate on the banks of the R. Teviot.

Rainfall, 1879—27.96 ins.: [Sunnyside, alt., 350 ft.; ht., 6 ft.; 26.36 ins., on 144 days].

Date of Onset and Duration of Frost—Nov. 28th to Dec. 14th; frost very intense from Dec. 2nd to 6th.

Min. Temps. and Dates—Dec. 3rd, 8 a.m., -1°; 12, noon, 9°; 2 p.m., 20°; 4 p.m., 0°; 9 p.m., -6°; Dec. 4th, 8 a.m., -13°; 10 a.m., 2°; 12, noon, 10°; 2 p.m., 20°; 4 p.m., 8°; 9 p.m., 6°;

Dec. 5th, 12 p.m., -1° ; temp. then rose to 30° , followed by 9 ins. of snow. At Ancrum House, dist., 1 m.; Dec. 4th, -10° : Kirklands, -16° : Nr. R. Teviot, -16° : Crailing, dist., 4 ms., E.; Dec. 4th, -18° : Ormiston, dist., 4 ms., N.; Dec. 4th, -18° .

Plants injured, 1879-80—32 (1), 27 (2), 1 (3)—Apples, stands, 1, 2. Apricots (still dying back, Aug. 2nd, 1880), 2. Araucaria, 1, 2. Arundo conspicua, 1, 2. Aucubas, 1, 2. Berberis Darwinii, 1; B. Simonsii, 1, 2; two other vars., 1, 2. Box, tree, 1, 2. Broom, 1, 2; Cedrus Deodara, 1, 2. Cistus, 1, 2. Clematis, on walls, slightly protected at base, 1, 2. Cratægus Oxyacantha, pink, fl. pl., 2; C. Pyracantha, 1. Desfontainea spinosa, 1. Escallonia macrantha, on wall and well covered, 1. Figs, on wall and well covered, 1, 2. Garrya elliptica, 1. Hollies, all kinds, green and variegated, 1; only two alive, 2. Ivies, various kinds, 1, 2. Laurel, Bay, 2. Laurel, Portugal, 2. Laurustinus, 1. Magnolia grandiflora, well covered, on wall, 1, 2. Oaks, from 30, 40 to 150 yrs. old, 2. Osmanthus ilicifolius, 1. Pampas grass, 1. Pears, stands, 1, 2. Privet, 1, 2. Raphiolepis ovata, 1. Rhododendrons, hybs. and ponticum, 1, 2. Roses, on walls, 1. Santolina, 1. Sequoia gigantea, 1, 2. Vines, very old kinds, 1, 2. Walnut, 2. Yew, common, 1, 2; Do. Irish, 3.

Plants uninjured—All herbaceous plants, owing to the depth of snow upon them.

2. KELSO.—Mr. W. B. Boyd.

Gen. Char. of Soil—Of a light, gravelly nature; very few places being on a clay subsoil.

Alt. and Exposure—150 to 200 ft.

Rainfall, 1879—[Springwood Park, alt., 130 ft.; ht., 1 ft.; 24·92 ins., on 219 days].

Min. Temps. and Dates—Dec. 3rd and 4th, -18° : [See METEOR. OBS. p. 126 and REP., No. 1, for temps. at Mt. Teviot, dist., 8 ms., S.; and Crailing, dist., 6 ms., S.: Milne-Graden, dist., 10 ms., N.E.; alt., 103 ft.; Dec. 4th, -3°].

Plants injured, 1879-80 — 20 (1), 27 (2), 0 (3)—Acer Pseudo-Platanus (Sycamore), 2. Ampelopsis, all (except A. Veitchii), 2. Apples, nearly all, 1. Apricots, on walls, 1. Araucaria imbricata, 1. Ash, 2. Aucuba japonica, 2. Beech hedges, 2. Berberis Darwinii, 2; B. dulcis, 2. Box, tree, 1. Bramble, variegated, 2. Cedrus Deodara, 1. Chestnut, Spanish, 1. Clematis Jackmanni, 2; C. viticella, 2. Cratægus, "evergreen Thorn," 2. Cytisus Labura

num, in exposed places, 1; *C. purpureus*, 1. *Deutzia scabra*, 1. Elder, variegated, 2. *Escallonia macrantha*, 2. Holly, variegated, 1. Ivies, nearly all, 1. *Jasminum nudiflorum*, 2; *J. officinale*, 2. Laurel, Bay, 2. Laurel, Portugal, 2. *Libocedrus decurrens*, 1. *Lonicera sempervirens*, 2. Oaks, many, 1. *Pæony*, tree, 2. Peaches, on wall, mostly, 1; Do. Royal George, 2. Pears, nearly all, 1. *Per-nettya mucronata*, 1. *Picea Pinsapo*, 2. Privet, 2. Quinces, 2. *Rhododendrons*, hybs., mostly, 1; some, 2. *Ribes sanguineum*, 2. Roses, H. P.'s, Gloire de Dijon and Dundee Rambler, 2. *Ruscus aculeatus*, 1. *Sequoia gigantea*, 2. *Weigela rosea*, 1. *Wistaria sinensis*, 2. Yew, common and Irish, 1.

Plant uninjured—*Ampelopsis Veitchii*.

Observation—Oaks, all at a lower level than 50 ft., above R. Teviot, had the young wood of the year 1877 kd. in winter 1878-79. Now the trees are quite dead, many 50, 80 to 100 yrs. old.

3. LILLIESLEAF, Riddell.—Mr. Jas. Tait.

Gen. Char. of Soil—Wet and clayey.

Alt. and Exposure—510 ft.; exposed to S.

Rainfall, 1879—[St. Boswell's, dist., 5 ms., N.E.; alt., 350 ft.; ht., 1 ft.; 27·84 ins., on 186 days].

Date of Onset and Duration of Frost—Nov. 30th to Dec. 14th; Jan. 11th to 27th.

Min. Temps. and Dates—Dec. 3rd, -2°; 4th, -4°: [St. Boswell's, dist., 5 ms. N.; Dec. 10th, -12°: Hawick (Silverbut Hall, dist., 7 ms., S.; Dec. 3rd, 0°: Dec. 11th, -2°: Woolfelee, dist., 17 ms., S.; Dec. 4th, -5°].

Plants injured, 1879-80—Apricots, pts. of shoot kd., 3. Laurel, Bay, 2. Laurel, Portugal (100), 1 or 2.

Observations—Fruit trees, the wood ripened badly and the fruit buds were imperfectly matured; hence, but few Apples, Pears and Plums in 1880. Bush fruit, black and red Currants, plentiful; but only half a crop of Gooseberries. *Rhododendrons* bore but few blossoms.

4. ST. BOSWELL'S, Mertoun House—Mr. W. Fowler.

Gen. Char. of Soil—Light, with a gravel subsoil.

Alt. and Exposure—About 230 ft.; exposed to S.

Rainfall, 1879—[Elliston, alt., 350 ft.; ht., 1 ft.; 27·84 ins., on 186 days].

Min. Temps. and Dates—Dec. 10th [?] -12°: Melrose Abbey, dist., 4 ms., N.W.; Dec. 4th, -5°: Kelso, dist., 8 ms., N.E.; alt., 130

ft.; Dec. 4th, -18°: Lilliesleaf, dist., 5 ms., S.; alt., 510 ft.; Dec. 4th, -4°].

Plants injured, 1879-80 — 8 (1), 18 (2), 3 (3) — Apples, some vars., 2. Apricots, 2. Araucaria imbricata, 2. Artichoke, globe, 1. Box, tree, where confined, 2. Broccoli, 1. Cedrus Deodara, 2. Cherry, Morello, 3. Chestnut, Spanish, 2. Clematis, 2. Cotoneaster, 2. Cratægus Pyracantha, 2. Cytisus Laburnum, 2. Holly, where confined, 2. Ivy, 2. Laurel, Bay, 1. Laurel, Portugal, kd. to snow, 2. Laurustinus, 1. Oak, 3. Peaches, 1, 2. Pears, 2, 3. Roses, dwfs., to snow, 2; Climbing, Gloire de Dijon, &c., 20 yrs. old, 1; stands., 1. Vegetables, green crops, all sorts kd. to grd., 1, 2. Yew, 2.

Observations—Fruit trees, have suffered more or less, but more especially from the cold, wet summer; inasmuch as the vars. of Apples and Pears continued to die by inches during the cold rains. The injuries were no doubt increased by the low temp. of the soil. Others of a more hardy nature suffered from the absence of sun and the consequent failure in ripening the wood. Trees and shrubs, the greatest injury to these, such as Box, Hollies, &c., occurred where they were in confined situations. Such are always hardier when the air circulates freely around them, as in many cases where the same vars. are standing free and exposed, they are uninjured.

DIVISION XIII.—(SCOT.) S. E. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879, FROM BERWICK, EDINBURGH, HADDINGTON, PEEBLES AND SELKIRK.

BERWICK. *Min. Rainfall*, St. Abb's Head, alt., 211 ? ft.; ht., 4 ins.; 23·31 ins.: max., Marchmont House, alt., 500 ft.; ht., 1 ft.; 33·92 ins., on 227 days. *Min. temps.*, Blackadder, Dec. 4th, -23°; Allenbank, -13°: Ninewells, -8°: Chirnside Bridge, -6°: Coldstream, alt., 100 ft.; Dec. 5th, -6°: Milne-Graden, alt., 103 ft.; Dec. 4th, -3°: Dunse, alt., 500 ft.; Dec. 4th, 0°: Thirlestane Castle, alt., 558 ft.; Dec. 3rd, 4°; 4th, 8°; 5th, 1°.

Plants injured, 1879-80 — 53 (1), 41 (2), 9 (3), total at 3 places.

EDINBURGH. *Min. Rainfall*, Edinburgh, alt., 300 ft.; ht., 63 ft.; 21·74 ins.: max., Glencorse, alt., 787 ft.; ht., 6 ins.; 44·95 ins. *Min. temps.*, Dalkeith, alt., 450 ft.; ht., 4 ft.; Dec. 4th, 0°; alt., 190 ft.; 5°: Edinburgh, Dec. 4th, 1°; Jan. 19th and 26th, 19°: Leith, alt., 22 ft.; Dec. 4th, 7°.

Plants injured, 1879-80 — 39 (1), 60 (2), 32 (3), total at 3 places.

HADDINGTON. *Rainfall*, the greatest occurred in June, July and Aug., instead of Sept., Oct. and Nov., as is usually the case. *Min. rainfall*, Seacliffe (N. Berwick), alt., 80 ft.; ht., 5 ft.; 26·60 ins.: max., Haddington, alt., 235 ft.; ht., 1 ft.; 29·52 ins. *Min. temps.*, Haddington, alt., 140 ft.; Dec. 4th, -5°: Tynninghame, Dec. 4th, 0°: Luchie, (N. Berwick), Dec. 3rd, 2°: Yester, alt., 420 ft.; Dec. 4th, 2°.

Plants injured, 1879-80—13 (1), 22 (2), 19 (3), total at 3 places.

PEEBLES. *Min. Rainfall*, Stobo Castle, alt., 590 ft.; ht., 9 ins.; 30·85 ins.: max., Cairnmuir, alt., 1150 ft.; ht., 5 ins.; 49·01 ins. *Min. temps.*, King's Meadow, alt., 540 ft.; Dec. 4th, 12°: The Glen (Innerleithen), alt., 820 ft.; Dec. 4th, -7°.

Plants injured, 1879-80 — 10 (1), 14 (2), 3 (3), total at 2 places.

SELKIRK. *Min. Rainfall*, Bowhill, alt., 697 ft.; ht., 11 ft.; 29·73 ins., on 171 days: max., Borthwickbrae, alt., 800 ft.;

ht., 2 ins.; 35·20 ins. *Min. temps.*, Galashiels, alt., 400 ft.; Dec. 4th, -10° ; also -6° .

Plants injured, 1879-80—2 (1), 5 (2), 1 (3), total at 1 place.

REPORTS.

1. BERWICK—COLDSTREAM.—Mr. J. Cairns.

Gen. Char. of Soil—Various, of clay, light loam &c.; but generally a good tenacious loam.

Alt. and Exposure—About 100 ft.; situated rather low, with a small lake and a river intersecting the grounds; about one mile from the R. Tweed.

Rainfall, 1879—26·05 ins.: max., July, 5·15 ins.; min., Sept., 0·65 ins.; av. for 11 years, 28·41 ins.

Date of Onset and Duration of Frost—Nov. 22nd; temp. was 13 times below freezing in Nov.; 22 times below freezing in Dec. After Dec. 13th, the frost was not so severe until Jan. 19th, 20° .

Min. Temps. and Dates—Dec. 2nd and 3rd, 3° ; 4th, 6° ; 5th, -6° ; 6th, 7° ; 7th, 8° ; 8th and 9th, 10° : [Twizel, dist., 3 ms., N.E.; alt., 103 ft.; Dec. 4th, -3°].

Plants injured, 1879-80—8 (1), 7 (2), 5 (3)—Apples, 3. Artichoke, globe, 2. *Aucuba japonica*, 1, 3. Broccoli, 2. Brussels sprouts, 2. Holly, 1, 2. Kale, 2. Laurel, Bay, 1, 2. Laurel, Portugal, 1. Peaches, 1, 2. Pears, 3. Rhododendrons, tender hybs, 1; others, 3, or uninjured. Roses, Dwf. H. P.'s, 3; Stands., 1; Teas, 1.

Observations—Roses, the dwfs. were not much hurt owing to their being covered during the hardest frost by almost a foot of snow, which proved an admirable protection for all dwarf things. Had it not been for the snow we should undoubtedly have had a larger list of the killed.

2. DUNSE, Marchmont House.—Mr. P. Loney.

Gen. Char. of Soil—A strong and tenacious red clay.

Alt. and Exposure—500 ft.; 20 ms. from the sea.

Rainfall, 1879—Ht., 1 ft.; 33·92 ins., on 227 days. Average of 3 previous years, 43·50 ins.

Date of Onset and Duration of Frost—Oct. 5th until Feb. 14th.

Min. Temp. and Date—Dec. 4th, 0° .

Plants injured, 1879-80—Laurel, Bay, 2. Roses, stands., 1.

3. DUNSE, Springwood Park, &c.—Mr. P. Loney.

Alt. and Exposure—Less than 300 ft.

Min. Temps. and Dates—Dec. 4th, -11° : [Blackadder, -23° : Allenbank, -13° : Ninewells, -8° : Chirnside Bridge, -6°].*

Plants injured, 1879-80—40 (1), 9 (2), 0 (3)—*Abies Menziesii*, 1. Apples, 2. Apricots, 1. *Araucaria imbricata*, 1. *Aristolochia Sipho*, 1. *Aucuba japonica*, 1. *Berberis vulgaris*, 1. Box, 1. *Castanea vesca*, 1. *Cedrus atlantica*, 1; *C. Deodara*, 1; *C. Libani*, 1. *Cotoneaster*, 1. *Cratægus*, sorts, 1. *Cupressus Lawsoniana*, 1; *C. viridis*, 1. *Cytisus Laburnum*, 1. *Escallonia macrantha*, 1. *Garrya elliptica*, 1. Holly, 1. Ivy, sorts, 1. *Jasminum*, sorts, 1. Laurel, Bay, 1. Laurel, common, 1, 2; *L. Portugal*, 1, 2. *Laurus-tinus*, 1. *Nectarines*, 2. Oaks, 1, 2. Peaches, 1. Pears, 2. *Philadelphus*, 1. *Picea Pinsapo*, 1. Plums, 2. Privet, sorts, 1. *Pyrus Aucuparia*, 1; *P. japonica*, 1. *Quercus cerris*, 1, 2. *Rhododendron ponticum*, 1. *Ribes sanguinea* and *alba*, 1. Roses, dwfs., 2; stands., 1. *Sequoia gigantea*, 1. *Thuja*, sp., 1; *T. Lobbii*, 1. Yew, 1.

Observations—The death of so many trees and shrubs is, in my opinion, greatly due to the cold wet seasons of 1876, 77 and 78, which caused an autumnal growth in low lying situations, especially in 1878 and 1879. The early frost of Dec., 1879, ruptured and burst the bark of some very large trees, such as Oaks, which were generally in full leaf, and ill prepared for such an attack; consequently many fine old trees were killed, while the majority lost the growth of the five previous years. The bark of trunks and branches was split from top to bottom.

4. LAUDER, Thirlstane Castle.—Mr. J. Whitton.†

Date of Onset and Duration of Frost—The intense frost of Dec., though hardly so severe or long continued as that of Dec., 1860, has been much more injurious to vegetation. Owing to the unfavourable nature of last year, plants were the less able to stand it. A snow-fall of about 7 ins. on Dec. 2nd helped much to save vegetables.

Min. Temps. and Dates—Dec. 3rd, 4° ; 4th, 8° ; 5th, 1° .

* *Jl. of Hort.* 1879, p. 482.

† *Report of Temps. during Winter of 1879-80, at R. Bot. Gardens, Edinburgh.* J. Sadler, p. 21. [Temp. of Dec. 4th, is given as -8° in Marriott's *Rep.*; G. H.]

Plants injured, 1879-80—5 (1), 25 (2), 4 (3)—*Acer Negundo*, var., 2. Apples, buds kd., 3; stands., 2. *Berberis*, 2. Broccoli, all sorts (excepting “Knight’s variegated”), 1. Brussels sprouts, one-half, 1. Box, 1. Cabbages, autumn-planted, 3; German Greens, 3; Savoys, one-half, 1. *Cedrus Deodara*, kd. to grd., 2. *Clematis*, 2. *Cotoneaster microphylla*, 2; *C. Simmonsii*, 2. Elms, 2. *Escalonia macrantha*, 2. Guelder Rose, 2. Hollies, green and variegated, 2. Ivy, 2. Laurel, common, 2; Do. Portugal, 2. Leeks, 3. *Libocedrus decurrens*, 2. Lilac, 2. *Menziesia polifolia*, 2. *Osmanthus*, 1. Peaches, young wood, kd. on walls, 2. Pear, buds kd., 3; stands., 2. *Pernettya mucronata*, 2. Privet, 2. *Rhododendrons*, 2. Roses, sorts, and every where, kd. to grd., 2. *Sequoia gigantea*, 2.

1. EDINBURGH—DALKEITH, Oxenford Castle.—Mr. A. Anderson.

Gen. Char. of Soil—A heavy loam or clay, on gravel; with some places on a blue retentive clay.

Alt. and Exposure—450 ft.; exposed to S. and W.

Rainfall, 1879—[Dalkeith, alt., 183 ft.; ht., 4 ins.; 26·83 ins.

Date of Onset and Duration of Frost—From the beginning until the end of Dec., excepting the 17th.

Min. Temps. and Dates—Dec. 4th, ht., 4 ft.; 0°. On grd., -5°.

Plants injured, 1879-80—3 (1), 8 (2), 6 (3)—*Alaternus latifolius*, 2. *Ampelopsis Veitchii*, on heavy soil, on wall, one plant, 3. *Aucuba japonica*, 2. *Berberis Darwinii*, 3. *Cotoneaster microphylla*, in a few places, 3. *Cryptomeria elegans*, 3; *C. japonica*, 2. *Eucalyptus globulus*, 1. *Euonymus radicans*, *albus variegatus*, 2. *Fuchsias*, 2. *Garrya elliptica*, on wall, 2. *Laurustinus*, sorts, 2. *Ligustrum japonicum*, 1. *Retinospora plumosa*, *aurea*, 3. Rosemary, 1. Roses, china, 2; sorts, 3.

Observations—We had comparatively little injury done, every thing being covered with six inches of snow; Globe Artichoke (unprotected), Broccoli (laid flat in Nov., and well covered with manure) and Lettuce (on sloping bank), all stood well.

2. DALKEITH, Palace Gardens.—Mr. M. Dunn.

Gen. Char. of Soil—A light warm, sandy loam, on an open, dry and gravelly subsoil.

Alt. and Exposure—190 ft.; 3 ms. from the sea, the ground sloping to N., towards the Forth of Forth; but well sheltered in all directions, excepting S.E., by heavy timber, favourably placed

for protecting vegetation from the severities of the weather.

Rainfall, 1879—27.23 ins. ; average (1875-78), 25 ins.

Date of Onset and Duration of Frost—Oct. 15th, 27° ; a few degrees of frost on 16th, 18th, 26th, 27th and 28th. Slight frosts for a few days from Nov. 1st ; Nov. 14th, 22° ; followed by thaw till 22nd, when the severest frost experienced here since 1860 began. Dec. 1st, 22° ; 2nd, 18° ; 3rd, 6° ; 4th, 5° ; 5th, 20° ; 6th and 7th, 22° ; 8th, 21° ; 9th, 27° ; 10th, 23° ; 11th, 22° ; 12th, 25°. These temps. were followed by a thaw till 18th. On 19th frost recommenced with a temp. of 24° ; 20th, 20° ; 21st, 21°. Three days thaw, and then three days slight frost followed ; while thaw prevailed from Dec. 28th to Jan. 10th. The frost then continued without a break until Jan. 10th ; min. temp. being on Jan. 18th, 18° ; the av. being 24° nightly. The two winter months, Dec. and Jan., had 38 frosty nights and a total of "342° of frost." The same two months in 1878-79 had 56 frosty nights and a total of 580° of frost, the severest night being Dec. 14th, when 10° were registered. However, the effects of the long-continued frost of 1878-79 were much less disastrous to vegetation than the shorter and sharper frost of the past winter.*

Plants injured, 1879-80—14 (1), 35 (2), 16 (3) — *Ampelopsis hederacea*, 2 ; *A. Veitchii*, pts. of young shts. kd., 3. *Arbutus Unedo*, 1, kd. to grd., 2. *Aucuba japonica*, 2, 3. *Azalea amana*, (6 years unhurt), 2. *Bambusa Fortunei variegata*, slightly browned, 3. *Berberis Bealii*, kd. to grd., 2. Broom, in low places, 1. *Catalpa syriacæfolia*, planted 1878, tips kd., 2. *Cedrus Deodara*, lost many leaves, 3. *Clematis lanuginosa*, and others of same strain, 1. *Daphne pontica*, in damp places, 1. *Deutzia gracilis*, young wood kd., 2. *Elæagnus reflexa*, on walls, kd. to grd., 2. *Eucalyptus globulus*, planted 1871, 25 ft. high, 1. *Euonymus fimbriata*, 1. *Eurya latifolia*, variegata, stood winter 1878-79, 1. *Griselinia littoralis*, kd. to grd., 2. *Hartogia capensis*, 2. *Hedera canariensis*, lost foliage and young shts., 2 ; *H. Rogeriana*, lost half foliage, 3. Laurel, Bay, kd.

* *Rep. on Temps. during the Winter*, 1879-80, at *Edinb. Bot. Gard.* by J. Sadler, p. 15. [Mr. Dunn usually gives the temps. as so many "degrees of frost." Here, as elsewhere, I have substituted the actual number as registered by the therm., thus "10 degrees of frost" are 22° F.; G. H.]

to grd., recovering, 2. *Laurus salicifolia*, lost foliage and tips of shoots, 2. *Laurustinus*, 2. Lavander, some, 1 (others unhurt). *Lavandula spica*, 1, 2. *Lycesteria formosa*, 3. *Ligustrum lucidum*, young shoots kd., 3. *Lonicera brachypoda*, aureo-reticulata, kd. to grd., 2. *Magnolia grandiflora*, on wall, lost most of foliage, 3. *Morus alba*, 1; *M. nigra* (Mulberry), young shoots kd., 3. *Nectarines*, on walls, 2. Pampas grass, 1, 2. Peaches, on walls, 2. *Paulownia imperialis*, young shoots, kd., 3. Privet, 2. *Quercus Ilex*, lost most of foliage, 3. *Rhododendrons*, Sikkim, a few, 1, 2, 3. *Robinia Pseud-Acacia*, 3. Rosemary, 1, 2. Roses, Banksian, on wall, kd. to grd., 2; China, common monthly, kd. to grd., 2; H. P.'s, 2, 3; Tea, on wall, including Maréchal Niel, kd. to grd., but recovering, 2. *Ruscus racemosus*, 2. *Sambucus racemosa*, 3. *Sophora japonica*, 3. *Spiræa Lindleyana*, 2; *S. Reevesiana*, 2; *S. prunifolia*, lost young shoots, 2; *S. Thunbergia*, do., 2. Strawberries, where exposed to morning sun, 2. *Tritoma uvaria*, 1, 2. Walnut, two-thirds of last year's shoots kd., 2. *Wistaria sinensis*, 2.

Note—The above by no means exhausts the lists of plants that have suffered from the effects of the winter, 1879-80; but the damage to others is of a comparatively trifling and temporary nature, from which they will soon recover.

Observations (General)—Vegetation in the autumn of 1878 was in a thoroughly ripened state; and, being also well protected by deep snow during the severest of the frost, suffered comparatively little injury. In the autumn of 1879, however, vegetation had already suffered much from the cold and wet of the previous summer, and was in the worst possible state to withstand the severities of the winter. Frost set in early, and very little snow fell while it lasted to protect the soft and badly-ripened growth of the last season, which in many instances succumbed to less than the usual amount of frost. Thus a good many trees of various kinds are observed with an unusual number of dead points of their last season's growth, arising, no doubt, from the severity of the frost acting on the half-matured growth of last year.

Obs. (Special)—*Clematis*, *C. lanuginosa* and others of the same delicate strain were killed; but all the *C. Jackmanni* tribe are perfectly uninjured. *Conifers*, these generally have not suffered at all; those introduced from Japan are particularly hardy, and withstand severe frost better than our native plants; *Cedrus Deodara* lost many

of its leaves, and *Picea Pindrow* lost them all, but both are again in fine foliage. *Fruit trees, &c.*, among hardy fruit plants there has not been much damage done. Nectarines and Peaches on walls have suffered most, a good deal of the young shoots being either killed or so badly injured as to be useless. The result is no fruit, and the trees present a very ragged appearance. Most kinds of fruit trees had abundance of blossom upon them this spring, especially Cherries and Plums; but owing to the unmaturing state of the buds last autumn, they set badly, and there will not be above an average crop of fruit as a rule. Some few trees are heavily laden, but a great many have not a fruit upon them, fully two-thirds of the Pear trees having none. Currants and Raspberries are abundant, Gooseberries being about an average. Strawberry plants, where exposed to the full sun in winter, have been a good deal injured by the repeated freezing and thawing; the fruit this year is about an average. *Vegetables*, these stood the severe frost well. Broccoli plants, laid over in Nov., with their heads to the N., but protected in no other way, came through without any loss, and have been plentiful and good from Nov. till the present time. Celery stood well without any protection; and all other winter crops, except a few Curled Kale and Savoys which grew in the lowest part of the garden, only a few feet above the level of the South Esk; where they were killed entirely, to a height of about 20 feet above the river as the ground rises from it. Vegetable crops this season are so far very satisfactory, and fully a month earlier than at the same period last year. *Flowering Shrubs*—A noteworthy fact in connection with the present season is the remarkable scarcity of flowers on most of our hardy trees and shrubs. Early Rhododendrons flowered pretty freely, but *R. ponticum* and all the later varieties are almost flowerless. Any flowers to be seen on them are puny and badly formed, and not at all attractive. Our Sikkim Rhododendrons, a large number of which have been raised from seed sent from India a good many years ago, and are now fine plants ranging up to 10 ft. high and as much through, have suffered considerably in their foliage; but few, if any, are killed outright, and most of them are breaking well from the old wood, and promise soon to recover their former vigour. Deutzias, Lilacs, Philadelphus, Ribes, Weigelas and others have as a rule but sparsely flowered. Many Horsechestnuts are without a single flower-spike; and the fine old Hawthorns, for which Dalkeith Park is famous, have

scarcely produced a well flavoured specimen this season. The Laburnum is almost the only flowering tree that has produced a good crop of blossom, and kept up its credit as one of the hardiest and best of our ornamental trees.

3. EDINBURGH, Royal Botanical Gardens.—Mr. J. Sadler.*

Rainfall, 1879—[Alts., 230—300 ft.; mean of 4 estimates, 28·10 ins.].

Date of Onset and Duration of Frost—In Nov. the therm. was at or below 32° on 17 mornings; the lowest readings being on the following dates:—2nd, 23°; 3rd, 26°; 4th, 21°; 14th, 20°; 15th, 25°; 22nd, 27°; 23rd, 28°; 28th, 25°; 29th, 18°; 30th, 19°. In Dec., the therm. was at or below 32° 23 times. From the 1st to the 13th there was hard frost every night, viz., 1st, 23°; 2nd, 21°; 3rd, 4°; 4th, 1°; 5th, 19°; 6th, 21°; 7th, 17°; 8th, 15°; 9th, 21°; 10th, 22°; 11th, 20°; 12th, 25°; 13th, 28°. On 8 mornings there was no frost. On the 25th the temp. was 35°, but on the 26th it was 20°. The temp. of the 4th, 1°, is the lowest registered since Dec. 24th, 1860, -6°. In Jan., the therm. was at or below 32° on 21 mornings. The following were the seven lowest readings:—12th, 23°; 14th, 23°; 19th, 19°; 20th, 23°; 21st, 24°; 26th, 19°; 27th, 24°. From the 1st to the 7th there was no frost, and during the day the therm. generally ranged from 42° to 52°, but although the weather was extremely mild for the season, spring vegetation made no progress owing to the decided check it received in Dec.

Min. Temps. and Dates—Dec. 4th, 1°; Jan. 19th and 26th, 19° [Leith, dist., 2 ms.; alt., 22 ft.; Dec. 4th, 7°].

Plants injured, 1879-80—22 (1), 17 (2), 10 (3)—*Abies bracteata*, 3. *Araucaria imbricata*, 3. *Arbutus Unedo*, 2. *Aucuba japonica*, 2. *Azara integrifolia*, 3. *Benthamia fragifera*, 1. *Callistemon salicifolium*, 2. *Ceanothus azureus*, 1. *Chamæbatia foliolosa*, 1. *Cordyline australis*, 2. *Cupressus macrocarpa*, 2. *Dacrydium Franklinii*, 3. *Edwardsia microphylla*, 1. *Erica arborea*, 1; *E. codonodes*, 1; *E. mediterranea*, 2. *Eurybia Gunnii*, 3; *E. ilicifolia*, 3; *E. Traversii*, 1. *Fitzroya patagonica*, 2. *Hydrangea japonica*, 2. *Iberis gibraltarica*, 1; *I. sempervirens*, 1. *Ilex diphyrena*, 1. Laurel, Bay, 2. Laurel, common, 3. *Laurustinus*, 2. *Leptosper-*

* *Report on Temps. during the Winter*, 1879-80, by J. Sadler, F.R.Ph.S., (Curator).

mum scoparium, 1. *Libertia formosa*, 2. *Mesembryanthemum uncinatum*, 1. *Olearia Haastii*, 1. *Osmanthus ilicifolius*, 2. *Pampas grass*, 1. *Phormium tenax*, 1. *Pinus Amscensis*, 1; *P. devoniana*, 1; *P. patula*, 1. *Piptanthus nepalensis*, 3. *Prunus ilicifolius*, 2. *Pyrus vestita*, var. *pyramidalis*, 2. *Rhamnus alaternus*, 2. *Robinia Pseud-Acacia*, 3. *Synara Scolymus*, 2. *Thea viridis*, 4 ft. high, 3. *Tritoma uvaria*, 2. *Veronica Andersonii*, 1; *V. salicifolia*, 1; *V. Traversii*, 1. Wallflowers, 1.

1. H ADDINGTONSHIRE — HADDINGTON, Yester House. — Mr. A. Shearer.

Gen. Char. of Soil—A stiffish clay, but well pulverized and drained.

Alt. and Exposure—420 ft.; in a hollow, surrounded on all sides by higher ground.

Rainfall, 1879—[Yester, alt., 425 ft.; ht., 1 ft.; 36.03 ins.].

Date of Onset and Duration of Frost—Dec. 3rd [Frost returned Jan. 19th (?): Tynninghame, 10 ms., N.; Jan. 19th, 19°: Coldstream, 23 ms., S.E.; Jan. 19th, 20°].

Min. Temp. and Date—Dec. 4th, 2°.

Plants injured, 1879-80—2 (1), 2 (2), 4 (3)—Apples, 3. Apricots, 3. Artichoke, globe, 1, 2. Asparagus, weak, 1880, 3. Aucubas, 1, 2. Laurel, common, 3. Laurustinus, 2.

Observations—Hollies and the Common and Portugal Laurels were all killed on the banks of the Tyne, at Haddington. The injuries here were not due so much to the frost as to the preceding wet summer. At the time of the frost we had 4 ins. of snow which gave great protection to most plants. No species of *Pinus* was injured.

2. NORTH BERWICK, Luchie.—Mr. W. M. Alexander.

Gen. Char. of Soil—A stiff wet clay.

Alt. and Exposure—On a slight eminence, exposed on all sides; about 2 ms. from the sea. The gardens and grounds are well sheltered by woods.

Rainfall, 1879—[N. Berwick, alt., 80 ft.; ht., 5 ft.; 26.60 ins.].

Date of Onset and Duration of Frost—The first severe frost was in Dec.; very little in Jan. Feb. 9th, 25°; occasional frosts till April 26th, 30°, the last.

Min. Temps. and Dates—Dec. 2nd, 13°; 3rd, 2°; 4th, 4°.

Plants injured, 1879-80—2 (1), 8 (2), 5 (3)—*Agapanthus um-*

bellatus, 2. Aloysia citriodora, 15 yrs., on S. and W. walls, 1878-79, 1. Arbutus, under shade of trees, 1. Aucuba japonica, vars., 3. Broccoli, poor crop, 3. Cherries, Morello, in damp stiff soil, 2. Euonymus, on E. wall, growing again from root, 2. Lonicera flexuosa, S. and W. walls, kd. to grd., 2. Laurel, Bay, 2. Laurustinus, 2. Magnolia, on wall, 3. Myrtle, on W. wall, covered with laurel boughs, 3. Pampas grass, 3. Roses, Banksian, 1; H. P.'s, stands., 2; Teas, on S.W. walls, 2.

Plants uninjured—Arbutus, where exposed to the sun and air. Fruit trees (excepting Morello Cherries), Herbaceous plants in borders, nothing was killed that survived the winter of 1878-79. Roses, dwfs., Vegetables, Brussels sprouts and garden greens, a fair crop.

3. PRESTON KIRK, Tynninghame.—Mr. R. P. Brotherton and Mr. J. Storie.

Gen. Char. of Soil—A pure clay, but mostly a friable dark loam. Subsoil of gravel, sand, sandstone and "trap."

Alt. and Exposure—20 to 90 ft.; exposed to E., but well protected.

Rainfall, 1879—27·81 ins.

Date of Onset and Duration of Frost—Dec. 2nd, 22°, to Jan. 19th, 19°.

Min. Temps. and Dates—Dec. 3rd, 0°; 4th, -1°·5: [Haddington, dist., 8 ms., S.W.; alt., 140 ft.; Dec. 4th, -5°: Luchie, dist., 5 ms., N.W.; Dec. 3rd, 2°].

Plants injured, 1879-80—9 (1), 12 (2), 10 (3)—Agapanthus, kd. to grd., 2. Apples, 3. Apricots, 3. Arbutus Unedo, 2, 3. Artichoke, globe, 2. Aucubas, 2, 3. Benthamia fragifera, 2. Broccoli (excepting Cattell's Eclipse), 1. Cabbages (excepting Seedlings), 1. Ceanothus, on wall, 2. Endive, 1. Escallonia macrantha, in open shrubbery, 3. Fuchsia Riccartoni, in open shrubbery, and on walls, 2. Gladiolus Brenchleyensis, 1. Laurel, Bay, 2, 3. Laurustinus, 2. Lettuce (excepting seedlings), 1. Pears, 3. Penstemons, 1. Phormium tenax, 1. Plums, 3. Quercus Ilex, 3. Roses, moss, 3; H. P.'s and Teas, mostly kd. to grd., 2. Salvia fulgens, 1; S. Marshalli, 1; S. patens, on walls, kd. to grd., 2. Tritomas, kd. to grd., 2.

Observations—Fruit trees, Apples, Apricots, Pears and Plums bore but little fruit in 1880. Roses, the only one that escaped was Gloire

de Dijon. Vegetables, besides that mentioned, Brussels sprouts, Cauliflowers, Corn-salad, Kale (Scotch), Leeks, Spinach and Turnip seedlings were all uninjured to any extent.

1. PEEBLES—INNERLEITHEN, The Glen.—Mr. A. Laing.

Gen. Char. of Soil—A gravelly and not deep loam.

Alt. and Exposure—820 ft.; very exposed.

Rainfall, 1879—[Stobo Castle, dist., 10 ms., W.; alt., 590 ft.; ht., 9 ins.; 30·85 ins.].

Min. Temps. and Dates—[Dec. 4th ?] -7°: Thirlstane, dist., 15 ms., N.E.; alt., 558 ft.; Dec. 4th, 8°].

Plants injured, 1879-80—3 (1), 4 (2), 2 (3)—*Aucuba japonica*, 1. *Ceanothus*, 1. *Crataegus Pyracantha*, 3. *Escallonia macrantha*, 2. *Furze*, fl. pl., 1. *Gaultheria Shallon*, 3. *Laurel*, common, 2. *Quercus Ilex*, 2. *Roses*, 2.

Observations—The wet summer of 1879 told badly on bedding plants. Some of the finer sorts refused to grow, such as *Alternantheras* and vars. of *Lobelia*. Peas have much mildewed and Potatoes badly flavoured from the continual rain; though Vegetables in general did very well.

2. PEEBLES, King's Meadows.—Mr. D. McFarlane.

Gen. Char. of Soil—Light and gravelly.

Alt. and Exposure—540 ft.; open and exposed.

Rainfall, 1879—[Stobo Castle, dist., 5 ms. from Peebles, alt., 590 ft.; ht., 9 ins.; 30·85 ins.].

Min. Temp. and Date—Dec. 4th, -12°.

Plants injured, 1879-80—7 (1), 10 (2), 1 (3)—Apples, stands., young shoots kd., 2. *Araucaria imbricata*, 1. *Aucuba*, 2. Broccoli, various, 1. Brussels sprouts, 1. Cabbages, savoy, 1; winter, 1. Celery, various kinds, 1. *Cupressus Lawsoniana*, 2. Hollies, kd. to grd., 2. Ivies, kd. to grd., 2. Laurel, Portugal, kd. to grd., 2. Pears, stands., 2. Rhododendrons, 3. Roses, Dwfs., 2; H. P.'s, 2; Stands., 1. *Sequoia gigantea*, 2. Vegetables, nearly all, 1.

Observation—Apples, these are now showing canker (1880).

1. SELKIRK—GALASHIELS, Langley.—Mr. D. Kemp.

Gen. Char. of Soil—Rather heavy; inclined to clay and very retentive.

Alt. and Exposure—400 ft.; sheltered from the N. and W.

Rainfall, 1879 — [Wooplaw, alt., 880 ft.; ht., 1 ft.; 30·22 ins., on 199 days].

Min. Temps. and Dates—Dec. 3rd, 0°; 4th, -6°: [Tweed Vineyard,* Dec. 1st, 22°; 3rd, -4°; 4th, -10°; 5th, 30°: Melrose Abbey, dist., 4 ms., E.; Dec. 4th, -5°: Melrose, alt., 280 ft.; Dec. 7th, -5°·5].

Plants injured, 1879-80 — 2 (1), 5 (2), 1 (3) — Arbutus, 2. Holly, 3; Do. Golden, 1; Do. Silver, 2. Laurel, Bay, 2. Laurel, Portugal, some 20 ft. high, 15 ins. circumf., 2. Laurus tinus, 6 ft. high, 20 yrs. old, 1. Roses, kd. to grd., 2.

Plants uninjured—Broccoli was quite unhurt; head cut in May, 9 ins. in diameter.

* *Gard. Chron.* 1879, Vol. xii., p. 765.

[*Erratum*—Mr. Whitton informs me on enquiry, that the temps. recorded in Mr. Sadler's pamphlet are wrong; and that they should be as follows:—Thermometer in a box, Dec. 3rd, -4°; 4th, -8°; 5th, -5°. Black bulb on grass, Dec. 3rd, -7°; 4th, -11°; 5th, -5°. See bottom of p. 134, *Supra*; G. H.]

DIVISION XIV.—(SCOT.) S. W. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM
AYR AND LANARK.

AYR. A cold spring with much frost; a wet sunless summer (Glendrishaig). Very low temp. throughout the year, wet summer months (Carsehead). *Rainfall*, 4.05 ins. below av. (Pinnmore). *Min. rainfall*, Auchinlee, Ayr, alt., 36 ft.; ht., 4 ft.; 31.74 ins.: *max.*, Pinnmore, alt., 187 ft.; ht., 1 ft.; 47.61 ins., on 211 days. *Min. temps.*, Culzean Gardens, and Kilmarnock, alt., 176 ft.; Dec. 4th, 10°: Ardrossan, alt., 14 ft.; Dec. 4th, 15°.

Plants injured, 1879-80—2 (1), 14 (2), 4 (3), total at 2 places.

LANARK. *Rainfall*, 2 ins. below av. (Lanark), 1.09 ins. below av. of 34 yrs., but summer cold (Bothwell Castle). *Min. rainfall*, Cambus Wallace, Biggar, alt., 748 ft.; ht., 6 ins.; 27.47 ins., on 208 days: *max.*, Wiston, Biggar, alt., 860 ft.; ht., 0 ins., 42.60 ins. *Min. temps.*, Bothwell Castle, alt., 146 ft.; Dec. 4th, 2°; Jan. 20th, 1°: Ridge Pk., Lanark, alt., 630 ft.; Dec. 4th, 2°: Cambuslang, alt., 146 ft.; Dec. 4th, 7°: Glasgow, alt., 190 ft.; Dec. 4th, 14°-6.

Plants injured, 1879-80—2 (1), 12 (2), 4 (3), total at 2 places.

REPORTS.

1. AYR—GIRVAN, Barganey.—Mr. D. Smith.

Gen. Char. of Soil—Mostly composed of boulder-clay with occasional deposits of gravel and alluvial matter from the bed of the R. Girvan.

Alt. and Exposure—About 90 ft.; exposed to E. and W.

Rainfall, 1879—[Pinnmore, Girvan, alt., 187 ft.; ht., 1 ft.; 47.61 ins., on 211 days].

Min. Temps. and Dates—[Culzean Bay, dist., 10 ms., N.; alt., 13 ft.; Dec. 4th, 10°].

Plants injured, 1879-80—2 (1), 4 (2)—*Apples*, Codling var., Ecklinville, Lord Suffield, and New Hawthornden, 2. *Broccoli*, 1. *Carrots*, 1. *Peaches*, 2. *Pears*, 2. *Roses*, 2.

Observations—Bedding Plants, such as Calceolarias, flowered well, otherwise flower-gardening was almost a failure. Conifers, made good growth, especially Cupressus Lambertiana (a fine specimen, 36 ft. high, by 38 ft. diam.); also Picea nobilis and P. Nordmanniana. Common Laurels and Rhododendrons made very strong growths and withstood the winter. I could perceive no injurious effects on other shrubs.

2. MAYBOLE, Culzean Gardens—Mr. D. Murray.*

Min. Temp. and Date—Dec. 4th, 10°.

Plants injured, 1879-80—8 (2), 4 (3)—Camellias, recovering, 3. Cornels, 2. Euonymus, sorts, 2. Fuchsias, old-established plants, in open borders, kd. to grd., 2. Hydrangeas, 2. Laurel, Bay, recovering, 3. Laurustinus, recovering, 3. Lonicera brachypoda aureo-reticulata, 2. Myrtles, 2. Phormium tenax, 2. Tamarix, 2. Veronicas, recovering, 3.

Observations—Some of the above were quite unprepared to withstand such a severe winter, as they were green and in a growing state when the frost set in, which has done more damage than any winter for the last 20 years.

1. LANARK—DALZIEL, Bothwell Castle.—Mr. A. Turnbull.

Gen. Char. of Soil—Various, but clay predominates.

Alt. and Exposure—146 ft.; exposed to W.

Rainfall, 1879—28·65 ins. Av. since 1844, 29·63 ins.

Date of Onset and Duration of Frost—Intense frost from Nov. 13th to Dec. 23rd.

Min. Temps. and Dates—Dec. 4th, 2°: [Cambuslang, dist., 4 ms., N.W.; alt., 146 ft.; Dec. 4th, 7°: Glasgow, dist., 8 ms., N.W.; alt., 190 ft.; Dec. 4th, 14°·6].

Observations—Most of our tender shrubs were killed by the frost, Dec. 24th, 1860, when the temp. fell to -11°. Since then we have only grown plants upon which we can depend as being perfectly hardy. Abies Douglasii is often regarded as a hardy, profitable timber tree; but out of 50 planted for trial, only one remains here quite healthy; while the others were killed or greatly injured by the frost of 1879-80. The best tree was planted on a dry and rather rocky knoll and is 40 ft. high, yet it was killed to within 8 feet of the ground.

* *Rep. on Temps. at Rl. Bot. Gard., Edinb.*, by J. Sadler, p. 23.

This is however by no means the worst locality in Scotland; for we have Larch trees with 140 feet of good measurable wood, and Spruce firs with very little less. It is very remarkable that on Dec. 23rd, 1878, the temp. fell to 2° , and the frost continued severe for a longer period than it did in 1879-80, and yet none of the Douglas Firs were greatly injured. Wellingtonias (Sequoias) on the other hand were much hurt; and common garden vegetables were far more injured in 1878-79 than in 1879-80. This year (1880) they have not suffered greatly; but when the frost was most severe, they were protected by snow.

DIVISION XV.—(SCOT.) W. MIDLAND COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM ARGYLL,
BUTE, DUMBARTON AND STIRLING.

ARGYLL. The weather during Jan., Feb., and March was piercingly cold, with hard frosts, frequent snow, rain and hail. April, May, June, very cold. Temp. fell below 32° in June and Aug. (Poltalloch). Frost, with only 3 or 4 days intermission from Oct. 22nd, 1878, to May 20th, 1879 (Tarbert). *Rainfall* below av. (Mull, Islay). Min. rainfall, Fladda, Jura, 27.75 ins.: max., Calgarry, Mull, alt., 120 ft.; ht., 1 ft. 6 ins.; 71.67 ins. *Min. temps.*, Lochgilphead, alt., 65 ft.; Dec. 4th, 10° : Kilmory, alt., 200 ft.; Dec. 4th, 12° ; Jan. 12th, 15° : Eallabus (Islay), alt., 71 ft.; Dec. 4th, 16° .4: 10 ms. E. from Oban, alt., 20 ft.; Jan. 12th, 18° .

Plants injured, 1879-80—3 (1), 6 (2), 14 (3), total at 3 places.

BUTE. *Min. Rainfall*, Pladda, (Arran), alt., 55 ? ft.; ht., 3 ft. 3 ins.; 33.52 ins.: max., Rothesay, alt., 116 ft.; ht., 1 ft.; 50.43 ins., on 213 days. *Min. temps.*, Rothesay, alt., 116 ft.; Dec. 4th, 18° .5: Corrie, Dec. 1st and 3rd; as also Jan. 12th, and 21st, 31° .

Plants injured, 1879-80—4 (1), 3 (2), 4 (3), total at 1 place.

DUMBARTON. A very cold year, with very little sunshine (Helensburgh). Almost constant drizzling rain from end of April to mid. Oct.; heavy rains Sept. and Dec. *Rainfall* below av. of 40 yrs. (Alexandria). Min. rainfall, Alexandria, alt., 40 ft.; ht., 1 ft.; 38.80 ins.: max., Loch Lomond, alt., 100 ft.; ht., 1 ft.; 80 ins. *Min. temps.*, Cardross, alt., 75 ft.; Dec. 5th, 5° .

Plants injured, 1879-80—4 (1), 7 (2), 8 (3), total at 2 places.

STIRLING. *Min. Rainfall*, Falkirk, ht., 1 ft.; 29.20 ins.: max., Strathblane, alt., 320 ft.; ht., 6 ins.; 47.70 ins. *Min. temps.*, Falkirk, alt., 7 ft.; Dec. 4th, 7° : Buchanan, alt., 100 ft.; Dec. 3rd, 8° .

Plants injured, 1879-80—2 (1), 0 (2), 7 (3), total at 2 places.

REPORTS.

1. ARGYLL—LOCHGILPHEAD, Kilmory.—Mr. A. Brown.

Gen. Char. of Soil—Stiff clay, in general.

Alt. and Exposure—200 ft.; exposed to S.W.

Rainfall, 1879—49·8 ins.

Min. Temps. and Dates—Dec. 4th, 12°: [Eallabus, (Islay), dist., 20 ms., W; alt., 71 ft.; Dec. 4th, 16°·4: Rothesay, dist., 25 ms., E.; alt., 116 ft.; Dec. 4th, 18°·5].

Plants injured, 1879-80—3 (1), 6 (2), 8 (3)—*Aristolochia sem-pervirens*, 2. *Arundo conspicua*, 2. *Bignonia grandiflora*, 3. *Buddleia Lindleyana*, 2. *Broccoli*, 1. *Camellias*, 3. *Escallonia pterocladia*, 3. *Eugenia Ugni*, 2. *Fuchsia*, 2. *Garrya elliptica*, 3. *Hedera algeriensis*, 3. *Leptospermum lanigerum*, 3. *Mitraria coccinea*, 2. *Pampas grass*, 3. *Rhus Typhina*, 1. *Spartium junceum*, 1. *Tritoma uvaria*, 3.

2. LOCHGILPHEAD, Poltalloch.—Mr. J. Russell.

Gen. Char. of Soil—A sandy loam, with a sand and gravel subsoil.

Alt. and Exposure—65 ft.; exposed to S. and E.

Rainfall, 1879—43·63 ins.

Date of Onset and Duration of Frost—Oct. 16th to Jan. 31st, 1880, with exception of short intervals.

Min. Temps. and Dates—Dec. 4th, 10°: [Rothesay, dist., 20 ms., S.E.; alt., 116 ft.; Dec. 4th, 18°·5].

Plants injured, 1879-80—6 (3)—*Ampelopsis Veitchii*, 3. *Ceanothus azureus*, on wall, 3. *Escallonia macrantha*, 3. *Eugenia apiculata*, 3. *Hypericum nepalense*, 3. *Phillyrea latifolia*, 3.

Observations—The summer of 1879 was wet, sunless and cold throughout, although the rainfall was about the average for the whole year; consequently vegetables never came to perfection, and some almost refused to grow, especially Cabbages, Celery and French Beans, late crops of Cauliflowers, &c. Trees and shrubs were not much injured, owing to the proximity to the sea; but the imperfect ripening of the wood in 1879 told seriously on the fruit crops of 1880.

3. OBAN, (10 ms., N.E. of).—Mr. J. McGlashan.

Gen. Char. of Soil—Of a pure peaty nature.

Alt. and Exposure—20 ft., exposed to W. and S.W.

Rainfall, 1879—74 ins. ; av., 63 ins.

Date of Onset and Duration of Frost — Dec. 1st., occasionally, till Feb. 2nd.

Min. Temp. and Date—Jan. 12th, 18°.

Observations—Of plants killed, I may say there has been few or none. The winters are generally mild; snow lying but a short time. I am obliged to store in cold pits, not so much against frost, as the excessive moisture which prevails here. Arbutus, Portugal Laurel and Laurustinus are never affected by frosts.

1. BUTE—CORRIE, Arran.—Rev. D. Landsborough.*

Alt. and Exposure—Level of high-water ; separate from the high-water mark by a roadway only. Protected on N. and partially on E. by woods, hills, 3000 ft., rising immediately behind.

Rainfall, 1879—[Pladda, dist., 15 ms., S. ; alt., 55 ? ft. ; 33·52 ins. : Rothesay (Bute), dist., 15 ms., N. ; alt., 116 ft. ; 50·43 ins., on 213 days].

Min. Temps. and Dates—Dec. 1st and 3rd, 31° ; Jan. 12th and 21st, 31° ; Feb. 26th, 36°. The min. temps. being about 12° or 14° above those of Glasgow.

Plants injured, 1879-80—4 (1), 3 (2 ?), 4 (3)—Casuarina quadrivalvis, 1. Cordyline australis ; C. indivisa, and C. Veitchii, injured, [2 ?]. Cyathea medullaris, 1. Dicksonia squarrosa, much browned, [3 ?]. Eucalyptus globulus, 2. Griselinia macrophylla, 1. Rubus australis, 3. Thamnopteris australaica, 1. Todea superba, 3.

Plants uninjured — Acacia melanoxylon, Aspidium coriaceum, Asplenium falcatum, A. lucidum, Camellias double white and single red, Coccoloba vespertilionis, Cunninghamia sinensis ?, Desfontainea spinosa, Dicksonia antarctica, Edwardsia grandiflora, Elæagnus japonicus variegatus, Eucalyptus "pendulous," Lomaria sp., Myrtle double, Photinia serrulata, Quercus Suber (at Brodick Castle), Todea hymenophylloides.

1. DUMBARTON—ALEXANDRIA, Auchendennan.—Mr. A. Scott.

* *Rep. on Temps., Winter, 1879-80*, by J. Sadler, p. 13.

Gen. Char. of Soil—Light and gravelly.

Exposure—Northern.

Rainfall, 1879—47.9 ins.

Date of Onset and Duration of Frost—First week in Dec., till Christmas.

Min. Temps. and Dates—[Cardross, dist., 3 ms., S.; alt., 75 ft.; Dec. 5th, 5°: Buchanan, dist., 7 ms., N.E.; alt., 100 ft.; Dec. 3rd, 8°].

Plants injured, 1879-80—*Conifers*, *Abies*, *Pinus*, &c., choice varieties 10 to 20 ft., the injuries received were almost imperceptible; *Cupressus Lambertiana*, 3, is injured more or less every spring, the tips of the shoots on the S. side suffering most; *Wellingtonias* stand well and thrive luxuriantly.—*Escallonia macrantha*, kd. to grd., 2. *Leycesteria formosa*, kd. to grd. every winter for last 10 yrs., 2. *Rhododendrons*, bloom scanty in 1880, owing to the wet summer of 1879.

Observations—In general the trees and shrubs have suffered less material injury in this district than in other parts of the country. Fruit trees, blossom plentiful, but being weak and immature, they bore scarcely any fruit in 1880.

2. CARDROSS, Grilston House.—Mr. J. McIntosh.

Gen. Char. of Soil—A light sandy loam near the Clyde; higher up it varies from clay to peat.

Alt. and Exposure—75 ft.; exposed to S. We suffer more from the want of sunshine than from wet or frost.

Rainfall, 1879—43.62 ins.; 24.42 ins. fell from June to Sept., 1879; ann. av. is 46.35 ins.

Date of Onset and Duration of Frost—Dec. 3rd, 10°; 4th, 7°; 5th, 5°; 6th, 8°; 7th, 14°; 8th, 16°; 9th, 15°; 10th, 24°; 11th, 26°.

Min. Temp. and Date—Dec. 5th, 5°.

Plants injured, 1879-80—3 (1), 6 (2), 4 (3)—*Arbutus rubra*, 3. Broccoli, early, 2. Celery, 3. Endive, 1. *Escallonia macrantha*, 3. *Eugenia Ugni*, 1. *Garrya elliptica*, catkins, kd., 2. Laurel, Bay, 3. Lettuce, 1. *Mitraria coccinia*, 2. Myrtle, 2. Parsley, 2. Spinach, 2.

Observations—Evergreen shrubs have not suffered here so much as on the east coast. In Edinburgh I saw many plants of *Arbutus*, *Aucuba japonica*, Roses, &c., all killed; which are here compara-

tively safe. The continued low temperature, rain and clouded skies during the summer months left every kind of plant ill prepared to stand the very low temperatures of December. Apples, Pears and Plums have all been very poor. Peach trees were still in leaf on the walls and a few buds set. Small fruits yielded good crops. I have observed that the geographical distribution of plants is correlated with meteorological phenomena; for the foliage of evergreen shrubs is finer on the west coast here, than I have seen it anywhere else. Several plants that would not live around Edinburgh, are quite at home here; such as *Hydrangea japonica*, *Mitraria coccinea*, and *Myrtles*; so that we find the winter comparatively mild; but Wheat tells of our want of sunshine, being 3 lb. per bushel heavier nearer Edinburgh than with us.

1. STIRLING—DRYMEN, Buchanan Castle.—Mr. A. Crosbie.

Gen. Char. of Soil—A stiff heavy loam.

Alt. and Exposure—100 ft.; sloping to S.

Rainfall, 1879—[Killearn, dist., 5 ms.; alt., 200 ft.; 43·54 ins., on 197 days].

Date of Onset and Duration of Frost—Nov. 28th to Jan. 1st.

Min. Temp. and Date—Dec. 3rd, 8° (therm. on N. wall).

Plants injured, 1879-80—6 (3)—Broccoli, 3. *Garrya elliptica*, 3. Laurel, Bay, 3. Pampas grass, under dry fern, 3. *Tritoma uvaria*, under leaf-mould, 3. Yew, variegated, 3.

Plants uninjured—*Abies Douglasii*, *Cedrus atlantica*, *C. Deodara*, *Cupressus Lawsoniana*, Portugal Laurel, *Picea cephalonica*, *P. nobilis*, *P. Nordmanniana*, *Pinus monticola*, *Retinospora aurea*, *R. plumosa*, *Rhododendrons* (buds only kd. on early sorts), *Sequoia gigantea*, *Thuja gigantea*.

Observations—Fruit trees, Apples showed more canker than usual, and bore thin crops; King of Pippins and Lord Suffield had the best and healthiest crops. Pears, *Beurré d'isle*, on walls, and *Duchesse d'Anjou* have good crops of fine fruit. This is unexpected as hardier sorts have failed to bear fruit on S. walls. Plums on S.E. and W. walls are bearing medium crops. Standard Damsons have a heavy crop. Vegetables have suffered most. The long continued frosts with sudden thaws and frosts following them, have been more destructive than the lowness of temp. Less damage has been done with a temp. of zero.

2. FALKIRK, Kerse House. Mr. T. Weir.

Gen. Char. of Soil—A strong clay.

Alt. and Exposure—About 6 ft. to 8 ft.; exposed to weather from all points of the compass.

Rainfall, 1879—29·20 ins. Av. is 33 ins.

Date of Onset and Duration of Frost—Oct. 15th. Severe frosts from Nov. 27th to Dec. 13th: the last frost being on May 9th.

Min. Temp. and Date—Dec. 4th, 7°.

Plants injured, 1879-80 — Broccoli, 1. Libocedrus decurrens, 18 ft., 3. Strawberries (Dr. Hogg and Maréchal McMahon), 1.

Plants uninjured—Broccoli, Cattell's Eclipse.

DIVISION XVI.—(SCOT.) E. MIDLAND COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879, FROM FIFE,
FORFAR AND PERTH.

FIFE. Very sunless up to the mid. of Sept.; then bright and dry. Unusual frost in the beginning of Dec.; on 3rd, temp., 0° (Kilmany). *Min. rainfall*, Isle of May, 19.60 ins.: max., Falkland, alt., 700 ft., ht., 1 in.; 43.78 ins. *Min. temps.*, Colinsburgh, alt., 350 ft.; Dec. 4th, -1° : Kilmany, Dec. 3rd, 0° : Kembach, alt., 98 ft.; Dec. 4th, 5th, 7° : Pittenweem, alt., 100 ft.; Dec. 13th, 8° .

Plants injured, 1879-80—15 (1), 10 (2), 4 (3), total at 3 places.

FORFAR. Summer sunless (Glamis Castle). *Rainfall* not much above av., except in the summer months (Hallyburton). *Min. rainfall*, Montroseness, 18.72 ins.: max., Crombie Res., alt., 522 ft.; ht., 3 ins.; 42.26 ins. *Min. temps.*, Hallyburton, alt., 280 ft.; Dec. 3rd, 0° : Glamis Castle, Dec. 3rd, 8° ; 4th and 9th, 9° : Carnoustie, Dec. 13th, 9° : Montrose, alt., 200 ft.; Dec. 4th, 10° : Cortachy, and Arbroath, Dec. 4th, 12° .

Plants injured, 1879-80—7 (1), 8 (2), 3 (3), total at 4 places.

PERTH. Want of sunshine and cold weather were the characteristic features of the year (Blair Athole). *Rainfall*, not so large as in some years; for although the summer was cold and sunless, there were no great falls; but rather a continual drizzle. Harvest, very late; but crops were gathered in very good order in Oct. (Lanrick Castle). *Min. rainfall*, Perth Academy, alt., 83 ft.; ht., 64 ft. 5 ins.; 19.15 ins.: max., Glen Gyle, alt., 380 ft.; 87 ins. *Min. temps.*, Moncrieff [Dec. 4th ?], 2° : Huntingtowerfield, alt., 45 ft.; Dec. 4th, 3° : Abercairny, alt., 200 ft.; Dec. 4th, 4° : Balgowan, alt., 200 ft.; Dec. 4th, 5° : Perth, alt., 34 ft.; Dec. 4th, 7° : Ochertyre House, alt., 360 ft.; Dec. 4th, 8° : Glen Almond, alt., 533 ft.; Dec. 4th, 10° .

Plants injured, 1879-80—9 (1), 14 (2), 2 (3), total at 3 places; elsewhere (at 4 places) very slight or none.

REPORTS.

1. FIFE—COLINSBURGH.—Mr. E. Tate.

Gen. Char. of Soil—A stiff clay, on blue-stone rock.

Alt. and Exposure—350 ft.; facing S.; $3\frac{1}{2}$ ms. from the Firth of Forth.

Rainfall, 1879—34·50 ins.

Date of Onset and Duration of Frost—Nov. 28th to Dec. 8th.

Min. Temps. and Dates—Dec. 4th, 7 a.m., -1° : [Kembach, dist., 8 ms., N.; alt., 98 ft.; Dec. 4th and 5th, 7° : see Rep. No. 3, Pit-tenweem, dist., 4 ms., E.].

Plants injured, 1879-80—10 (1), 6 (2)—Apples, 1, 2. Arbutus, sorts, 1. Aucuba, kd. to grd., 2. Broccoli, 1. Box, 1. Escallonia, sorts, all kd. to grd., 2. Eucalyptus globulus, 2. Laurel, Bay, 1, 2. Laurel, common, 1. Laurustinus, 1, 2. Peaches, 1. Roses, hybs., a few dwfs., many stands., and on walls, 1. Thuja, sp., 1.

Observations—Apples, suffered most on the stiffest part of the garden. Arbutus, suffered most where sheltered, planted in clumps. Aucubas, starting again. Bay Laurels, the greater part of those outside were killed. We had 100 fine plants in tubs, which we put into the shade and protected well; we have lost 6 of the best, and the rest are injured. Laurustinus, splendid bushes, totally killed; the smaller plants being not much injured; but where they were in no way sheltered, they are quite dead.

2. NEWPORT, St. Fort.—Mr. W. Conacher.

Gen. Char. of Soil—A light loam on Whinstone rock; a fine early land.

Alt. and Exposure—From 80 to 120 ft.; a fine S. slope, on well wooded grounds; 2 ms. S. of the Tay.

Rainfall, 1879—[Dundee, E. Necrop., dist., 3 ms., N.; alt., 167 ft.; ht., 5 ins.; 32·30 ins., on 148 days].

Date of Onset and Duration of Frost—Frost set in early, but was not of long duration.

Min. Temps. and Dates—[Kembach, dist., 8 ms., S.E.; alt., 98 ft.; Dec. 4th, 5th, 7° : Hallyburton (Cupar-Angus), dist., 15 ms., N.W.; alt., 280 ft.; Dec. 3rd, 0°].

Plants injured, 1879-80 — 3 (2), 2 (3) — Apples, stands., 2. Apricots, 3. Hollies, 2. Peaches, 3. Pears, 2.

Plants uninjured—Trees and shrubs, none hurt, including Araucarias and other evergreens, as Indian Rhododendrons, which have stood well; they are large and fine with many flower buds (1880).

Observations—Apples, many were nearly killed, but with the present fine season have recovered. Apricots, are bearing no fruit, but are forming fine wood. Hollies, many showed signs of decay in Feb. and March, with a heavy load of fruit, the berries not having been ripe in Dec.; they have now quite recovered. Peaches, bore no fruit, but are forming fine wood.

3. PITTENWEEM, Grangemuir.—Mr. H. Rose.

Gen. Char. of Soil—A stiff loam, the garden requiring ridging over in the winter.

Alt. and Exposure—100 ft.; exposed to E. and S. gales; $1\frac{1}{2}$ ms. from the sea.

Rainfall, 1879—[Elie, dist., 4 ms., S.; alt., 30 ft.; ht., 1 ft.; 31·30 ins.].

Date of Onset and Duration of Frost—Severest frost from Dec. 13th to 20th.

Min. Temps. and Dates—Between Dec. 13 and 20th, 8° : [Colinsburgh, dist., 3 ms., W.; Dec. 4th, -1° : Kembach, dist., 8 ms., N.; alt., 98 ft.; Dec. 4th, 5th, 7° : Carnoustie, dist., 20 ms., N.; alt., 288 ft.; Dec. 13th, 9°].

Plants injured, 1879-80—5 (1), 1 (2), 2 (3)—Broccoli, almost all, 1. Laurels, common, 3. Laurustinus, 2. Penstemons, 1. Roses, dwfs., 3; stands., single trees, 1. Thuja, sp., 12 ft., 1. Veronica Andersoni, 8 or 9 yrs. old, 1.

1. FORFAR—Carnoustie.—Mr. T. Mitchell.

Gen. Char. of Soil—A light friable loam on whinstone, rotten sandstone and “till.”

Alt. and Exposure—288 ft.; dist., 3 ms., S., from the sea, to which it slopes gradually; but at a distance of half a mile, N., it rises to 100 ft. higher. Exposed fully to W. wind.

Rainfall, 1879 — [Craigton, dist., 5 ms., W.; alt., 481 ft.; ht., 3 ins.; 40·88 ins., on 159 days].

Date of Onset and Duration of Frost—We seldom have much frost here. The temp. rarely falls below 12° . Once in 1860 it fell to 6° or 4° . On the other hand it seldom rises to 80° ; only once or twice in a warm summer, and then for an hour or two at

most. Such is the experience of 27 years. The winter of 1878-79 being so long continued, injured plants more than that of 1879-80; while the wet summer followed by the frost setting in so early killed them.

Min. Temp. and Date—Dec. 13th, 9°.

Plants injured, 1879-80—3 (1), 5 (2), 1 (3)—Apples, 2. Cherries, 2. Daphne Mezereum, 1. Escallonia macrantha (excepting one on a S. wall), 1. Laurustinus, 3. Leycesteria formosa, 1. Pears, 2. Rhododendrons, 27 yrs. old, from seed, 2. Roses, China, H. P.'s, and Tea, 2.

Observations—Shrubs of all kinds were not much injured as they make only short growths, the wood of Apples seldom ripens well, and only occasionally is there a good crop of fruit.

2. CUPAR-ANGUS, Hallyburton.—M. W. Gow.

Gen. Char. of Soil—A dry brown loam, on Old Red Sandstone.

Alt. and Exposure—280 ft.; on the N. slope of the Sidlaw Hills.

Rainfall, 1879—Not much above av. here except in summer months: [Dundee, dist., 10 ms., S.; alt., 167 ft.; ht., 5 ins.; 32·30 ins., on 148 days].

Date of Onset and Duration of Frost—Nov. 12th to Feb. 15th; with only a few days intermission. Greater frost occurred in the Valley of Strathmore, at a lower situation.

Min. Temp. and Date—Dec. 3rd, 0°.

Plants injured, 1879-80—4 (1), 2 (2), 2 (3)—Apricots, 3. Aucuba japonica, 3. Broccoli, 1. Escallonia macrantha, 2. Laurels, Bay, 1. Lettuces, 1. Maple, common, 1. Roses, H. P.'s, 2.

Plants uninjured—*Coniferæ*, All are safe as only the hardier sorts are grown; e.g., Cryptomeria elegans (near a lake), C. japonica, Cupressus Lawsoniana, C. sempervirens, Picea lasiocarpa, P. nobilis, P. Nordmanniana, P. picta, Sequoia gigantea, Taxodium sempervirens.

Observations—Little or no bloom appeared on Hawthorns, Laburnums and Lilacs, and there were no berries on Hollies and Currants; Gooseberries and Strawberries bore fair crops; but Apples and Pears were failures, while Plums produced but half a crop.

3. FORFAR, Glamis Castle.—Mr. G. Johnston.*

Rainfall, 1879—[Dundee, E. Necrop, 10 ms.; 167 ft., 32·30 ins.].

Date of Onset and Duration of Frost—The frost affected us very

* Report on Temps., Winter 1879-80, by J. Sadler, p. 11.

little. We had a coating of snow which helped to preserve whatever it rested upon.

Min. Temps. and Dates—Dec. 3rd, 8°; 4th and 8th, 9°.

Plants injured, 1879-80—Roses, alone were injured having been newly planted; the wood was probably not well ripened, owing to the cold sunless summer of 1879.

4. KIRRIEMUIR, Cortachy Castle.—Mr. W. Reid.*

Min. Temps. and Dates—Thermometer, ht., 3 ft., and protected; Dec. 3rd, 14°; 4th, 12°; 11th, 16°; Jan. 13th, 13°; 14th, 14°; 20th, 20°. Av. temp. of Dec., 27°·5; av. temp. of Jan., 30°.

Observations—Vegetation has suffered very little here. Every thing started away in spring much better than I expected after the preceding wet and sunless summer. Fruit trees &c. promise well.

1. PERTH—CARSE OF GOWRIE.—Mr. P. Loney.

Gen. Char. of Soil—Light and black, on Whinstone rock; lower grounds are on gravel, with clay in low carse land.

Alt. and Exposure—233 ft.; on the front of the Sidlaw Hills; S. aspect.

Rainfall, 1879—[Errol (Fingask Castle), alt., 80 ft.; ht., 9 ins., 30·38 ins.].

Min. Temps. and Dates—[Perth, dist., 8 ms. ?, W.; alt., 34 ft.; Dec. 4th, 7°; Hallyburton, dist., 8 ms. ?, N.; alt., 280 ft.; Dec. 3rd, 0°].

Observations—Araucarias, Sequoias, and rare sorts of Coniferæ, as well as all kinds of evergreens, grow extremely well here. Common vegetables produced fine crops last season. Potatoes were of first-rate quality and without much disease.

2. CRIEFF, Abercainry.—Mr. J. Brown.

Gen. Char. of Soil—A light friable loam.

Alt. and Exposure—About 200 ft.; somewhat sheltered.

Rainfall, 1879—[Crieff (Ochertyre), alt., 325 ft.; ht., 9 ins.; 38·59 ins.].

Date of Onset and Duration of Frost—Sept. 24th, 30°·5, to Feb. 9th, 24°.

Min. Temps. and Dates—Oct. 28th, 24°; Nov. 13th, 18°; Dec. 4th, 4°; Jan. 23rd, 18°.

Plants injured, 1879-80—Trees and shrubs suffered scarcely at

* *Report on Temps. during the Winter, 1879-80*, by J. Sadler, p. 11.

all. Flowering shrubs, such as Hawthorns, Rhododendrons, &c., bore extremely little blossom in 1880. Vegetables, *e.g.*, Broccolis, Brussels sprouts, &c., were all more or less injured.

Observations—In consequence of the wet summer there was little or no fruit outside, on walls and standard trees. Small fruits were, however, somewhat plentiful.

3. CRIEFF, Drummond Castle.—Mr. J. Robb.*

Rainfall, 1879—[Crieff (Ochertyre), dist., 2 ms., W. ; alt., 325 ft. ; 38·59 ins.].

Plants injured, 1879-80—The Portugal Laurel is the only plant injured, a great many of which are “singed.”

Plants uninjured—Aucuba japonica, Brussels sprouts, Cabbages (savoy), Heaths (hardy), Kale, Leeks, Roses, H. P.’s, dwfs., and stands.

Observations—The winter of 1878-79 hurt us much. Ceanothus, sorts, 12 ft., on S. wall, were kd. to grd., but recovered. Heaths, 150 large plants were killed ; as many Standard Roses (excepting Gloire de Dijon). Juniperus communis hibernica, large plants were killed.

4. CRIEFF, Ochertyre House.—Mr. G. Croucher.

Gen. Char. of Soil—Light and gravelly with a similar subsoil.

Alt. and Exposure—360 ft. ; Shrubbery ranges from 300 to 450 ft. ; 45 ms. from the sea.

Rainfall, 1879—38·59 ins. ; mean of 7 yrs., 44·72 ins.

Date of Onset and Duration of Frost—Nov. 24th to Jan. 5th, from Jan. 10th to 27th.

Min. Temps. and Dates—Shaded therm., Dec. 3rd, 19° ; 4th, 17° : exposed therm., Nov. 14th, 15° ; Dec. 3rd, 10° ; 4th, 8°.

Observations—Partly owing to the warm S. exposure, and the steep declivity of our pinetum and shrubbery ; and also to the distance each plant is pruned and kept apart from each other, the death-rate has been almost nil. From repeated comparisons of readings of low temps., the range is about 10° higher here than at the Perth Nurseries and along the Valley of the Earn from Perth to Crieff. During the severe frost of 1860-61 our readings were from 10° to 12° above those at the Rl. Bot. Gardens, Edinburgh [alt., 230—300 ft.], when so many conifers and shrubs were killed

* *Rep. on Temps., Winter, 1879-80*, by J. Sadler, p. 12.

there. Here, only a very few Bay Laurels were browned. Our collection of species of *Abies* and *Picea* may be considered complete, while among the true Pines. *e.g.*, *P. insignis*, &c., those generally reported as killed elsewhere in *The Gardeners' Chronicle*, stand here quite uninjured. In 1876 a complete collection of *Taxaceæ* were planted out, all being quite hardy here. Our collection of shrubs includes nearly all the popular species and varieties at present in commerce: all of which may be set down as hardy; and where the soil is suitable, they make very satisfactory growth.

5. PERTH, Balgowan.—Mr. J. Fairlie.

Gen. Char. of Soil—Very light and poor; but improved by cultivation. Subsoil very hard and gravelly, impervious to water.

Alt. and Exposure—About 200 ft.; and nearly level; aspect, S.

Rainfall, 1879—[Perth (Inchbank), alt., 24 ft.; ht., 1 ft. 6 ins.; 33·03 ins.].

Date of Onset and Duration of Frost—Dec. 2nd, severe frost till 11th.

Min. Temps. and Dates—Dec. 3rd, 12°; 4th, 5°; on these two nights were the only exceptionally severe frosts during the winter.

Plants injured, 1879-80—5 (1), 5 (2), 1 (3)—*Buddlea globosa*, in shrubbery, facing S., 1. Cherry, Morello, on N. wall, 2. Fruit trees, in open grd., 2; on wall, 3. *Geum coccineum*, 1. Laurels, Bay, in open grd., 2. *Lilium auratum*, in open grd., seven-eighths, 1. Pampas grass, in open grd., 2. Roses, H. P.'s, one-fifth, 1. *Tritoma Uvaria*, in open grd., 1. *Zauschneria californica*, 2.

Observations—*Lilium auratum*, these were in the N.W. corner of a walled-in garden, facing S. and E. Roses, in a spot carefully and specially made for them; they are the finest H. P.'s, and thrive well. Vegetables, Cabbages, Winter Onions and Spinach never did better. *Zauschneria californica* is now coming weakly from portions of the roots.

6. PERTH, Huntingtowerfield.—Mr. A. Bayne.

Gen. Char. of Soil—Porous, with a gravelly subsoil.

Alt. and Exposure—45 ft.; nearly flat, with a S. aspect.

Rainfall, 1879—33·7 ins.

Date of Onset and Duration of Frost—Nov. 28th; lasting 16 days; then slight frosts at intervals during the rest of the winter.

Min. Temp. and Date—Dec. 4th, 3°.

Plants injured, 1879-80—2 (1), 5 (2), 1 (3)—*Asparagus*, 2.

Aucuba japonica, 2. Broccoli, 2. *Erica*, sp., 2. Laurel, Bay, 3. Laurel, Portugal, 3. *Prumnopitys elegans*, 1. *Retinospora ericoides*, 1. Roses, 2.

Plant uninjured—*Cedrus Deodara*, though killed here in the winter of 1860.

Observations—With the exception of the few plants indicated, but little injury was done here by the wet summer of 1879 and the severe winter of 1879-80. With the past fine summer, trees, shrubs and plants were never looking better.

7. PERTH, Moncreiffe House.—Mr. Wm. S. Bisset.*

Rainfall, 1879—[Perth (Inchbank), dist., 3 ms., N.; alt., 24 ft.; ht., 1 ft. 6 ins.; 33·03 ins.].

Date of Onset and Duration of Frost—Very severe; temp. was on two nights a few degrees lower than in 1878-79.

Min. Temp. and Date—Dec. [3rd and 4th ?], 2°.

Plants injured, 1879-80—2 (1), 4 (2)—Broccoli, one-half, 1. Hollies, 2. Laurel, Bay, much browned, 2. *Laurustinus*, ditto, 2. Roses, Noisette and Tea, 1, 2.

Plants uninjured—Brussels sprouts and Savoy.

Observations—Hollies, in some parts of the ground have been much injured. From the effects of the frost, and the tremendous crop of berries, many of the plants are not expected to recover. Up to June 4th, 1880, the bushes were laden with berries, but since then the wood pigeons have been feeding on them. *Effects in 1880*—The injurious effects of last winter have been as nothing compared with those of the ungenial season of 1879. From the immature state of the wood we had no flowers on outside Nectarines and Peaches. Plums flowered abundantly but the fruit has mostly dropped off. The flowers of Apples and Pears were weakly and in many instances deformed, and consequently the crop is very deficient. Currants, Gooseberries and Raspberries promise a fair crop. Strawberries look well, but the excessively dry weather we are now having is telling upon them (June, 25th, 1880).

* *Rep. on Temps. during the Winter*, 1879-80, by J. Sadler, p. 12.

DIVISION XVII.—(SCOT.) N. E. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM ABERDEEN, BANFF, ELGIN, KINCARDINE AND NAIRN.

ABERDEEN. A dark and damp year (Braemar, Tillypronie, &c.). *Rainfall*, least on record (Braemar); 3 ins. below av. (Logie); considerable, in summer, with abnormal deficiency during last 3 months (Tildydesk). Crops below average (Drumoak, Logie, &c.). *Min. rainfall*, Skene, alt., 500 ft.; 26·64 ins.: max., Midmar, alt., 570 ft.; ht., 8 ins.; 36·20 ins., on 188 days. *Min. temps.*, Pitcaple, alt., 230 ft.; Dec. 3rd, -3°: Braemar, alt., 1114 ft.; Dec. 3rd, 4th, -1°; Jan. 17th, 11°: Fyvie Castle, alt., 150 ft.; Dec. 3rd, 1°: Haddo House, Dec. 3rd, 2°: Birk Hall, alt., 900 ft.; Dec. 4th, 4°: New Pitsligo, alt., 495 ft.; Dec. 4th, 14°·9: Aberdeen, alt., 84 ft.; Dec. 3rd, 14°·6; alt., 96 ft.; Dec. 3rd and 5th, 15°.

Plants injured, 1879-80 — 18 (1), 28 (2), 9 (3), total at 4 places.

BANFF. The most unpropitious year for agriculture; protracted snow storms in Jan. and Feb.; and from March 1st to end of Aug. temp. was much below the av. Crops of all kinds, bad; and in the upland district corn did not ripen before being destroyed by frosts at end of Oct. (Keith). *Min. rainfall*, Tomintoul, alt., 1103 ft.; ht., 1 ft. 1 in.; 27·69 ins.: max., Keith, alt., 364 ft.; ht., 1 ft.; 32·10 ins., on 167 days. *Min. temps.*, Cullen House, alt., 100 ft.; Dec. 2nd, 7°: Gordon Castle, alt., 90—120 ft.; Dec. 2nd, 3rd, 15°.

Plants injured, 1879-80—3 (1), 5 (2), 8 (3)—total at 2 places.

ELGIN. Remarkably low temp. during the summer and want of sunshine until Sept. Very late harvest and crops immature (Elchies, Brodie Castle, Dunphail). *Min. rainfall*, Covesea Skerries, 13·95 ins.: max., Aberlour, alt., 560 ? ft.; ht., 1 ft. 6 ins.; 30·91 ins., on 163 days. *Min. temps.*, Ballindalloch, alt., 530 ft.; [Dec. 2nd or 3rd?], -4°: Dunphail, alt., 475 ft.; Dec. 3rd to 6th, 3°: Brodie Castle, alt., 50 ft.; Dec. 2nd, 16°.

Plants injured, 1879-80—22 (1), 19 (2), 7 (3), total at 3 places.

KINCARDINE. First quarter of year stormy with snow; second quarter, wet; third, wet and cold; fourth, very fine, but with intense frost and snow from Nov. 27th to Dec. 13th (Fettercairn). *Min. rainfall*, Fettercairn, alt., 230 ft.; ht., 3 ins.; 32.40 ins., on 190 days: max., Lawrence Kirk, alt., 370 ft.; ht., 11 ins.; 42.43 ins. *Min. temp.*, Arbuthnott, alt., 600 ft.; Dec. 4th, 2°.

Plants injured, 1879-80—4 (1), 3 (2), 2 (3), total at 1 place.

NAIRN. Summer of 1879 wet, with bad effect on fruit crops (Kilravock); *Rainfall*, not excessive; winter, not severe (Cawdor, Kilravock). *Min. rainfall*, Nairn, alt., 60 ft.; ht., 1 ft.; 23.08 ins.: max., Cawdor, alt., 220 ft.; 28.37 ins. *Min. temps.*, Nairn, alt., 84 ft.; Dec. 3rd, 14°: Cawdor, alt., 220 ft.; [Dec. 2nd?], 18°.

Plants injured, 1879-80—Few or none, at 1 place.

REPORTS.

1. ABERDEEN—AUCHTERLESS, Fyvie Castle.—Mr. R. Farquhar.

Gen. Char. of Soil—A rather heavy clay, and a good deal mixed with stones.

Alt. and Exposure—150 ft.; exposed somewhat to N.

Rainfall, 1879—[Ellon, dist., 13 ms., E.; alt., 349 ft.; 32.93 ins.].

Date of Onset and Duration of Frost—The severest frost commenced Dec. 1st, 19°; Dec. 2nd, 9°; 3rd, 1°; 4th, 5°; 5th, 27°.

Min. Temps. and Dates—Dec. 3rd, 1°: [Haddo House, dist., 7 ms. ? E.; Dec. 3rd, 2°: New Pitsligo, dist., 13 ms., N.E.; alt. 495 ft.; Dec. 4th, 14°-9].

Plants injured, 1879-80—8 (1), 9 (2), 5 (3)—Apples, 3. Artichoke, globe, one-half, 1. Asparagus, Conover's Colossal, 2. Beet, from wet, 1. Broccoli, 1, 2. Brussels sprouts, 2. Cabbages, 1; Greens, 3; Savoys, 2; Celery, kd. to grd., and then rotted below, 1. Laurel, Bay, cut back, 2. Laurel, Portugal, cut back, 2. Leeks, all above grd., 1. Onions, winter, 3. Parsley, mostly, 1. Pears, 3. Privet, 1, 2. Raspberries, River's perpetual, mostly kd. to grd., no fruit, 1880, 2. Rhododendrons, sorts, 3. Roses, H. P.'s; stands, 30 sorts, mostly kd. to grd., 2.

Plants uninjured—Conifers, from the nature of the situation, it is only the hardier vars. that are grown; these being well established sustained little or no injury. Vegetables, some of the later sorts of Broccolis were saved; of Brussels sprouts, a few survived.

Observations—Apples and Pears, were both very deficient in 1880; from the want of sun and excessive moisture, the fruit buds were not properly matured in 1879. Asparagus, is not nearly so strong now, as formerly. Privet, a hedge 150 yards long, and 4 ft. high, was most severely injured, some plants entirely kd., others kd. to grd.; the whole required replanting. Rhododendrons, portions of young wood injured, and so few buds ripened that the flowering in 1880 was the worst ever seen.

2. BALLATER, Birk Hall.—Mr. S. Reid.

Gen. Char. of Soil—Light and sandy.

Alt. and Exposure—900 ft.; exposed to N.E.

Rainfall, 1879—[Aboyne, dist., 10 ms.; alt., 576 ft.; 35.15 ins., on 156 days].

Date of Onset and Duration of Frost—Sept. 24th, alternating for some weeks.

Min. Temps. and Dates—Dec. 4th, 4°: [Braemar, dist., 15 ms., W.; alt., 1114 ft.; Dec. 3rd and 4th, -1°].

Plants injured, 1879-80—1 (1), 3 (2), 1 (3)—Laurel, Bay, shooting from roots, 2. Laurel, common, 1. *Picea lasiocarpa*, 3. Privet, 2. Vegetables, 2.

Observations—Herbaceous plants, most of these have not flowered in 1880. Privet, has much improved. Vegetables, were so late that they were almost useless.

3. INVERURY, Haddo House.—Mr. J. Forrest.*

Rainfall, 1879—[Manar Farm, Inverury, dist., 10 ms., S.W.; alt., 270 ? ft.; ht., 15 ft.; 31.02 ins.].

Date of Onset and Duration of Frost—Dec. 3rd, 2°; 4th, 4°; 11th, 8°. A good deal of frost occurred in Jan., but not nearly so severe as in Dec. The results of the frost would in many cases have been worse, had it not been that we had at the time nearly 6 ins. of snow on the ground.

Min. Temps. and Dates—Dec. 3rd, 2°: [Fyvie Castle, dist., 7 ?

* *Rep. on Temps., Winter, 1879-80*, by J. Sadler, p. 10.

ms., W. : alt., 150 ft. ; Dec. 3rd, 1° : Piteaple, dist., 10 ms., S.W. ; alt., 230 ft. ; Dec. 3rd, -3°].

Plants injured, 1879-80—4 (1), 12 (2), 3 (3)—Apricots, young wood kd., 3. Artichokes, globe, 2. Aneuba japonica, kd. to grd., 2. Broccoli, nearly all, 1. Broom, 1. Cabbages, "German greens," one-half, 1. Ceanothus, sp., 2. Celery, and other winter veg., 3. Desfontainea spinosa, 2. Escallonia macrantha, 2. Euonymus radicans, varieg., 2. Furze, 1. Laurel, Bay, kd. to grd., 2. Laurel, common, Colchican, 2 ; Do. Portugal, 2. Pears, young wood kd., 3. Rhododendron ponticum, in low-lying districts, nearly kd. to grd., 2. Roses, on walls, all sorts, 2 ; H. P.'s and stands, kd. to snow, 2.

Plants uninjured—Herbaceous plants, violas &c., being covered with snow suffered no injury ; Wallflowers have also stood better than in less severe winters.

4. INVERURY, Piteaple Castle.—Mr. G. Thomson.

Gen. Char. of Soil—A sandy loam.

Alt. and Exposure—230 ft. ; exposed to E.

Rainfall, 1879—[Inverury, dist., 4 ms., S.E. ; alt., 270 ? ft., 31·02 ins.].

Min. Temps. and Dates—Dec. 3rd, -3° : [Fyvie Castle, dist., 9 ms., N. ; alt., 150 ft. ; Dec. 3rd, 1° : Aberdeen, dist., 18 ms., S.E. ; alt., 84 ft. ; Dec. 3rd, 14°·6].

Plants injured, 1879-80—5 (1), 4 (2)—Araucaria imbricata, 1. Cedrus Deodara, 1, 2. Laurel, Bay, 1, 2. Laurel, common, 1, 2. Sequoia gigantea, 1, 2.

Observations—The effect of the wet summer of 1879 was apparent in the almost total absence of blossoms on the Apple and Pear trees, Rhododendrons and bedding-out plants. Of small fruits the crop has been fair and of superior flavour in 1880.

1. BANFF—CULLEN, Cullen House.—Mr. G. Berry.

Gen. Char. of Soil—A cold clay soil.

Alt. and Exposure—100 ft. ; well sheltered by trees all round.

Rainfall, 1879—[Keith, dist., 10 ms., S. ; alt., 364 ft. ; 32·10 ins., on 167 days].

Date of Onset and Duration of Frost—Nov. 6th, more or less but slight till May.

Min. Temps. and Dates—Dec. 2nd, 7° : [Gordon Castle, dist., 10 ms., S.W. ; alt., 90 to 120 ft. ; Dec. 2nd and 3rd, 15°].

Plants injured, 1879-80—3 (1), 4 (2), 7 (3)—Apples, 3. Apricots on walls, 3. Broccoli, 1. Cabbages, 3. Chimonanthus fragrans, 1. Escallonia macrantha, 3. Laurel, Bay, 2. Laurustinus, 2. Leeks, 3. Peaches on walls, 3. Pears, 3. Rhododendrons, Eng. hybs., fl. buds, kd., 2. Roses, Ayrshire, Bourbons, H. P.'s and Teas, 2. Wallflowers, 1.

2. FOCHABERS, Gordon Castle.—Mr. J. Webster.

Gen. Char. of Soil—A dark sandy loam resting on blue clay ; and a red loam on the New Red Sandstone formation.

Alt. and Exposure—90 to 120 ft. ; open to the Moray Firth, which is about $3\frac{1}{2}$ ms. distant.

Rainfall, 1879 — 28·36 ins. ; av. being 27·60 ins.

Date of Onset and Duration of Frost—Nov. 25th to Dec. 12th ; the winter being mild afterwards. During the period of dense fogs and severe frost in S. of England, in Jan. 1880, we had beautifully soft, balmy weather. The spring and summer have been remarkably fine here to the end of Sept., 1880.

Min. Temps. and Dates—Dec. 2nd and 3rd, 15° ; exactly the same on Dec. 13th, 1878-79.

Plants injured, 1879-80—Magnolia grandiflora, quite unprotected, in S. aspect, had the foliage more injured than in any previous winter for 30 years, owing no doubt to the wood having been imperfectly ripened ; only two flowers being produced in 1880. Roses, climbing and stands, suffered most, many being severely injured ; they languished and grew weakly through the summer of 1880, but had eventually to be removed.

Plants uninjured—Fuchsia Riccartoni and Laurustinus on high ground and unprotected.

1. ELGIN—FORRES, Brodie Castle.—Mr. J. Clarke.

Gen. Char. of Soil—A black sandy loam.

Alt. and Exposure—50 ft. ; exposed to N.E.

Rainfall, 1879—23·48 ins.

Date of Onset and Duration of Frost—Nov. 24th to Dec. 12th ; Jan. 8th to 20th.

Min. Temp. and Date—Dec. 2nd, 16° (therm. on N.W. wall ; ht., 4 ft.).

Plants injured, 1879-80—1 (1), 6 (2)—Abies Mensiesii, 2. Arbutus, 2. Laurel, Bay, 2. Laurustinus, 2. Roses, H. P.'s, 2 ; Tea, 1.

Observations—I think the injury to plants was more owing to the low temperature of the summer months and to the unripe state of the wood, than to the actual severity of the frost. Apart from the severe frost in Dec., we had an exceptionatly open winter.

2. FORRES, Dunphail. — Mr. D. Myers.

Gen. Char. of Soil—Sandy loam.

Alt. and Exposure—475 ft. : exposed to S.W.

Rainfall, 1879—[Nairn, dist., 10 ms., W.; alt., 60 ft.; 23·08 ins.].

Date of Onset and Duration of Frost—From Dec. 3rd to 6th, each night, 3°.

Plants injured, 1879-80 — 19 (1), 12 (2), 5 (3)—*Araucaria*, 1. *Aucubajaponica*, 1; *A. j. longifolia*, 1; *A. j. macrophylla*, 3; *A. j. picta*, 1; *A. j. vera*, 2. *Berberis Darwinii*, 3; *B. Jamesonii*, 1; *B. Newberti*, 3. *Ceanothus azureus*, 1; *C. Gloire de Versailles*, 1. *Cryptomeria japonica*, 1; *C. Lobbi*, 2. *Cupressus torulosa*, 1. *Cytisus*, white Portugal Broom, 1. *Escallonia Ingrami*, 2; *E. macrantha*, 2; *E. rubra*, 1. *Eugenia Ugni*, 1. *Euonymus*, three vars., 1. *Fitzroya patagonica*, 1. *Furze*, fl. pl., 1. *Garrya elliptica*, 2. *Laurel*, Bay, 1, 2. *Laurustinus*, 2. *Picea bracteata*, 3; *P. cephalonica*, 1; *P. grandis*, 2; *P. Pinsapo*, 3; *P. Webbiana*, 2. *Pinus argentea*, 2. *Roses*, budded on *Manetti*, 2; dwarfs on own roots, 2; stands., 1. *Taxodium distichum*, 3; *T. sempervirens*, 1.

Observations—Vegetables of 1879 were generally very inferior, Broccolis, Brussel sprouts and Cauliflowers being entirely useless. Fruit was very plentiful but never came to perfection. The wood of 1879 not having ripened, Apples, Pears and Plums failed in 1880. Small fruit, however, *e.g.* Currants, Gooseberries and Strawberries, have been very fine this year.

3. INVERAVEN, Ballindalloch Castle.—Mr. D. Rose.

Gen. Char. of Soil—A medium loam on a gravelly subsoil.

Alt. and Exposure—530 ft.; exposed to S.W.

Rainfall, 1879—[Grantown, dist., 10 ms, S.W.; alt., 712 ft.; 27·75 ins., on 163 days].

Date of Onset and Duration of Frost—End of Nov.; continued on into Dec.

Min. Temps. and Dates—[Dec. 2nd or 3rd ?], -4°: [Dunphail, dist., 14 ms., N.W.; alt., 475 ft.; Dec. 3rd, 3°].

Plants injured, 1879-80 — 2 (1), 1 (2), 2 (3) — *Arbutus*, 3.

Cotoneaster macrophylla, 1; C. buxifolia, 3. Laurel, Portugal, 2. Roses, all, 1.

Observations—In my opinion it was not the intensity of the frost during the winter 1879-80 that was the chief cause of so much damage being done to the plants; for in the winter, 1878-79, we had a more intense frost and one of a longer duration than that of the winter of 1879-80; when very little damage was done to plants. It was, in fact, the unripeness of the young wood, caused by the very wet and late summer of 1879, which was the main cause of the damage.

1. KINCARDINE — FORDOUN, Arbuthnott House. — Mr. J. M. Gairns.

Gen. Char. of Soil—A black and brown loam; on a hard, sandy, clay subsoil.

Alt. and Exposure—600 ft.; aspect, S.E.

Rainfall, 1879—[Lawrencekirk, dist., 5 ms., S.W.; alt., 370 ft.; 42·43 ins.].

Date of Onset and Duration of Frost—Nov. 30th to Dec. 20th.

Min. Temps. and Dates—Dec. 4th, 2°: [Aberdeen, dist., 20 ms., N.E.; alt., 96 ft.; Dec. 3rd, 5th, 15°].

Plants injured, 1879-80—4 (1), 3 (2), 2 (3)—Araucaria imbricata, 1. Aucuba japonica, 1. Cedrus Deodara, 1, 2, 3. Laurel, Bay, 12 ft., 1. Laurel, Portugal, 3. Roses, Gloire de Dijon, 2; H. P.'s, kd. to grd., 2.

Observation—Roses, the H. P.'s, though killed to within a few inches of the roots, have made the strongest wood last summer that I have ever seen (Dec. 15th, 1880).

1. NAIRN—NAIRN, Cawdor Castle.—Mr. J. Maitland.

Gen. Char. of Soil—Light, on a gravelly subsoil, with sandstone rock below.

Alt. and Exposure—220 ft.; exposed to N.; 5 ms. from the German Ocean.

Rainfall, 1879—28·37 ins.

Date of Onset and Duration of Frost—End of Nov. and beginning of Dec.; winter, open afterwards.

Min. Temp. and Date—End of Nov., for 3 nights, 14°: [Nairn, dist., 4 ms., N.E.; alt., 84 ft.; Dec. 3rd, 14°].

Observations—The summer of 1879, although sunless, had no excess of rain (28·37 ins.), and with the exception of a fortnight in the end of November and the beginning of December, when the thermometer fell to 14°, the rest of the winter was quite open. So that no plant, tree or shrub suffered more than in ordinary seasons, with the exceptions of a few Roses and other plants which had been injured in the preceding severe winter, and made late growth. Small fruits of all sorts had an average crop; but Apples and Pears with very few exceptions were a complete failure.

2. NAIRN, Kilravock Castle.—Mr. J. Manson.

Gen. Char. of Soil—Light.

Alt. and Exposure—235 ft.; exposed to S.

Rainfall, 1879 — [Nairn, dist., 5 ms., N.; alt., 84 ft.; 23·86 ins., on 185 days].

Plants injured, 1879-80—None.

Observations—The winter was not a severe one here, and there was consequently no damage to plants. The wet summer, however, had a bad effect on the fruit crops of 1880.

DIVISION XVIII.—(SCOT.) N. W. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM INVERNESS AND ROSS.

INVERNESS. The whole year was cold; *Rainfall* less than of any year since 1860 (Portree). Frost and snow, and exceptionally dry during first two months (Dunvegan, Loch Maddy, &c.). Min. rainfall, Inverness, alt., 104 ft.; ht., 4 ft.; 25·48 ins.; mean of 30 yrs., 25·08 ins.: max., Glenquoich, alt., 660 ft.; ht., 2 ft.; 92·05 ins. *Min. temps.*, Beauley, alt., 125 ft.; and Roy Bridge, alt., 310 ft.; Dec. 3rd, 11°: Dunvegan Castle, alt., 24 ft.; Dec. 1st, 12°: Cul-loden, alt., 104 ft.; Dec. 3rd, 16°·5.

Plants injured, 1879-80—3 (1), 10 (2), 10 (3), at 1 place; and 0 at 1 place.

ROSS. A uniformly wet year; no great floods but almost constant drizzle. *Rainfall*, below av.; very little sunshine (Lochbroom). Min. rainfall, Tarbetness, alt., 61 ? ft.; ht., 3 ft. 4 ins.; 18·19 ins.: max., Loch Alsh, alt., 150 ft.; ht., 3 ft.; 67·03 ins., on 145 days. *Min. temps.*, Tulloch Castle, alt., 300 ft.; Dec. 3rd, 7° [?]: Ardross, alt., 450 ft.; Dec. 3rd, 9° [?].

Plants injured, 1879-80—9 (1), 6 (2), 12 (3), at 3 places.

REPORTS.

1. INVERNESS—GLEN URQUHART, Balmaccan.—Mr. A. McDonald.

Gen. Char. of Soil—Light; soil is largely composed of vegetable mould and peat; one-half on a hard red “pan,” the other on loamy sand.

Alt. and Exposure—Situated in a valley, with S.E. direction, at the foot of a nearly perpendicular ascent, rising to 300 ft.; whence a plain extends to the foot of a chain of high hills; consequently the garden is well sheltered from W. and N.W. winds, but rather ex-

posed to E. and N.E. winds. It is also exposed to early and late frosts, which prove very injurious to early flowers and late vegetables.

Rainfall, 1879—[Glen Strathfarrer, dist., 12 ms., W.; alt., 461 ft.; ht., 1 ft.; 55·98 ins.].

Date of Onset and Duration of Frost—Nov. 25th; severe for two weeks.

Min. Temps. and Dates—[Beaully, dist., 10 ms., N.; alt., 125 ft.; Dec. 2nd, 11°: Roy Bridge, dist., 32 ms., S.W.; alt., 310 ft.; Dec. 3rd, 11°].

Plants injured, 1879-80—3 (1), 10 (2), 10 (3)—Asters, 2. Begonias, 2. Beans, 3; French, 1. Cabbages, 3. Chrysanthemums, 3. Dahlias, 3. Geraniums, 2. Gladioli, 3. Heliotropes, 1. Hyacinths, 2. Nasturtiums, 1. Nectarines, 2. Peaches, 2. Peas, 3. Pears, 2. Pelargoniums, 2. Petunias, 2. Plums, 3. Salads, 3. Salvias, 3. Stocks, 2. Zineas, 3.

Observations—The autumn of 1879 was very chilly and cold, and in consequence the young wood of fruit trees, including Peach trees, &c., but excepting Plums, did not ripen, and being attacked by early frost so severely they were almost killed. Bedding out plants were very much injured by the cold rains of 1879; and not being naturally strong they were more exposed to the effects of early frosts. Vegetables gave good crops, excepting those injured by the rain and especially by the frost.

2. INVERNESS, Dochfour House.—Mr. K. Stewart.

Gen. Char. of Soil—A light loam with a gravelly or sandy subsoil.

Alt. and Exposure—100 ft.; exposed to S.W.

Rainfall, 1879—[Inverness, 27·61 ins.].

Min. Temp. and Date—[Dec. 2nd and 3rd ?], 17°.

Observations—No plants have been injured whatever. It has been the mildest winter we have had for many years past. *Primula sinensis* lived out of doors all the winter, with only the protection or shelter of a wall and in an easterly exposure.

1. ROSS—ALNESS, Ardross Castle.—Mr. R. Massie.

Gen. Char. of Soil—A light loam.

Alt. and Exposure—450 ft.; exposed to S.

Rainfall, 1879—34·55 ins.

Date of Onset and Duration of Frost—Dec. 3rd, “23° of frost” [9° ?], with slight intermission till end of March.

Plants injured, 1879-80—2 (1), 6 (3)—Apples, 3. Broccoli, William’s Alexandra, 1. Laurel, Bay, 1. Laurel, common, 3; Do. Portugal, 3. Pears, 3. Plums, 3. Strawberries, 3.

2. DINGWALL, Tulloch Castle.—Mr. G. McKinlay.

Gen. Char. of Soil—Clay, on a subsoil of cold clay; rotten rock with alluvial deposit occur in the lower grounds.

Alt. and Exposure—300 ft.; exposed to S.

Rainfall, 1879—Excessive [?: Dingwall, alt., 3 ft.; ht., 1 ft. 1 in.; 20·01 ins.].

Date of Onset and Duration of Frost—Nov. 27th to March 2nd. The gardens have a very fine exposure, and being on a rather steep incline, the frost did not affect us quite so much as some other parts of Rosshire; but the previous summer wood of fruit trees suffered much, being cut back to within five or six inches of the winter pruning of 1878.

Min. Temps. and Dates—Dec. 3rd, 25°, [7° ?]: [Beaully, dist., 9 ms., S.; alt., 125 ft.; Dec. 2nd, 11°].

Plants injured, 1879-80—5 (1), 2 (2), 2 (3)—Cabbages, 1. Cauliflowers, 1. Cupressus horizontalis, 1, 3. Escallonia macrantha (struck by lightning?), 2, 3. Roses, 1, 2, 3.

Plants uninjured—Cotoneaster, Leycesteria formosa, Magnolia grandiflora, and all hybrid Rhododendrons.

3. KILMUIR, Balmagowan Castle.—Mr. T. Urquhart.

Gen. Char. of Soil—A sandy loam.

Alt. and Exposure—300 ft.

Rainfall, 1879—[Ardross Castle, dist., 5 ms., W.; alt., 450 ft.; ht., 1 ft.; 34·55 ins., on 190 days].

Min. Temps. and Dates—Ardross Castle, Dec. 3rd, “23° of frost” [9° ?].

Plants injured, 1879-80—2 (1), 3 (2), 5 (3)—Apricots, 2. Ash, weeping, growth of 1879 only kd., in shaded place, 3. Elæagnus, 3. Laurel, Bay, 3. Peaches, 1, 2. Roses, sorts, especially Teas on walls, 1. Taxodium sempervirens, 2. Weigela, 3. Willow, weeping (see Ash), 3.

Plants uninjured—Roses, Climbing devoniensis, and Gloire de Dijon.

DIVISION XIX.—(SCOT.) N. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM CAITHNESS AND SUTHERLAND.

CAITHNESS. Hardy trees and shrubs are never killed here by frost, which was not below 18° in winter 1879-80, (Dunbeath Castle.) A hard and protracted winter (1878-79), a cold and wet and late spring, cold sunless humid summer, and a good but late autumn, with very low temp. (Watten Station). *Min. rainfall*, Wick, alt., 77 ft.; ht., 1 ft. 9 ins.; 22·30 ins., on 209 days: max., Georgemas, 36·57 ins. *Min. temp.*, Wick, alt., 76 ft.; Dec. 3rd, 15° .

SUTHERLAND. *Rainfall*, smallest for six years (Assynt). 2 ins. below av. (Dunrobin Castle).* *Min. rainfall*, Tongue Ho., alt., 45 ft.; ht., 5 ins.; 27·11 ins.: max., Assynt, alt., 200 ? ft.; ht., 9 ins.; 66·80 ins. *Min. temps.*, Lairg, alt., 460 ft.; Dec. 3rd, 4° : Dunrobin Castle, alt., 12 ft.; Dec. 2nd, $19^{\circ}8$; Jan. 12th, 26° .

REPORTS.

1. SUTHERLAND—GOLSPIE, Dunrobin Castle.—Mr. D. Melville.†
Gen. Char. of Soil—A light, black, sandy loam.

Alt. and Exposure—10 to 15 ft.; close to the sea; sheltered on N., N.W. and N.E.; but exposed to E., S.E., S., S.W., and W.

Rainfall, 1879—29·14 ins., on 187 days. Av. for 10 years, 31·71 ins.

Date of Onset and Duration of Frost—Nov. 28th till Dec. 26th; no severe frost subsequently.

Min. Temp. and Date—Dec. 2nd, $19^{\circ}7$.

Plants injured, 1879-80—Apples, stands., 2. Hollies, 2. Pears, 2. Roses, stands., many, 1.

* See, *The Weather in Sutherland, Gard. Chron.*, 1880, vol. xiii. p. 120.

† Partly from *Rep. on Winter*, 1879-80, by J. Sadler, p. 10.

Plants uninjured—*Acer Negundo variegatum*, *Aralia Sieboldii*, *Arundo conspicua*, *Escallonia macrantha*, *Fuchsia Riccartoni*, *Garrya elliptica*, *Bay Laurel*, *Laurustinus*, *Phormium tenax*, *Salisburia*, *Tritoma uvaria*.

Observations—Our proximity to the sea gives us comparative immunity from intense destructive frosts, both in winter and spring; therefore we have no great list of killed and injured to record. We had a good many deaths among standard Roses last winter and spring; this being partially due to the drying winds prevalent in March and April. Some Hollies have shed their leaves in part. The wet sunless summer of 1879 has left its effects, not so much in death, as in unripened wood, as in the case of most wall trees and standard Apples; the consequence is a poor crop for this season. On the last mentioned trees the crop is nil. The same may be said of Pears, both on walls and standards. Small fruit trees in most cases yielded a fair average crop, as the autumn months were fine. Kitchen garden vegetables stood well; especially Celery, which never kept better.

DIVISION XX.—(IRELAND) MUNSTER.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM CLARE,
CORK AND TIPPERARY.

CLARE. A cold and wet year, agricultural produce of the poorest and worst description (Kilrush, Miltown Malbay). *Min. rainfall*, Kilrush, alt., 61 ft.; ht., 7 ft.; 32·98 ins., on 214 days: max., Ennis, alt., 21 ft.; ht., 3 ft. 2 ins.; 42·70 ins., on 156 days.

Plants injured, 1879-80—11 (1), 5 (2), 1 (3), total at 2 places.

CORK. A cold and unpropitious year; harvest, much later than usual (Black Rock, Cork). *Min. rainfall*, Queenstown, alt., 140 ft.; ht., 15 ft.; 32·96 ins., on 212 days: max., Roche's Point, alt., 32 ft.; ht., 1 ft. 9 ins.; 55·14 ins., on 201 days. *Min. temps.*, Fota Island, alt., 30 ft.; Dec. 2nd, 15°: Roche's Point, alt., 37 ft.; Dec. 2nd and 5th, 26°.

Plants injured, 1879-80—3 (1), 16 (2), 14 (3), total at 1 place.

TIPPERARY. A universally wet and cold summer, with a great absence of sunshine; autumn, fine and dry (Clonmel, Tipperary, Killaloe, &c.). *Min. rainfall*, Nenagh, alt., 116 ft.; ht., 1 ft.; 30·02 ins., on 161 days: max., Ballina, alt., 115 ft.; ht., 5 ins.; 42·23 ins., on 192 days. *Min. temp.*, Clonmel, alt., 800 ft.; Dec. [5th ?], 15°.

Plants injured, 1879-80—20 (1), 12 (2), 7 (3), total at 1 place.

REPORTS.

1. CLARE—ENNIS, Doora.—Mr. Jas. Johnstone.

Gen. Char. of Soil—Good and loamy, with a limestone and partly gravelly subsoil.

Alt. and Exposure—Tolerably high and open to S.E.

Rainfall, 1879—Heavy during sum. and aut.: [Ennis, dist., 2 ms.; alt., 21 ft.; 42·70 ins., on 156 days].

Date of Onset and Duration of Frost—Severe frost commenced about the middle of Dec., and lasted three weeks.*

Plants injured, 1879-80 — 7 (1), 1 (2), 1 (3)—*Araucaria*, 1; Broccoli, 1. Laurel, Bay, 1. Laurustinus, 1. Myrtles, on S.E. wall, 1. *Quercus Ilex*, 3. Roses, Banksian, on S.E. wall, 1; Stands., 1, 2.

Observations—Subsequent to the frost in Dec., it was a very mild winter with much rain all through the following spring.

2. NEWMARKET FERGUS, Dromoland Castle.—Mr. W. Wilson.

Gen. Char. of Soil—Damp, with a loamy surface, on a limestone subsoil.

Alt. and Exposure—Near the sea-level.

Rainfall, 1879—Almost continuous from May to mid. of Aug.; and then at intervals during the autumn.

Plants injured, 1879-80 — 4 (1), 4 (2)—*Arbutus*, 1, 2. Laurel, Bay, 1, 2. Laurustinus, 1, 2. *Phormium tenax*, 1, 2.

Observations — The injury done to plants in this locality was immense. Owing to the continued rain during the summer and aut. of 1879, fruit trees did not ripen their wood. Much of the wood of Nectarines and Peaches died back during the spring and summer of 1880, as the sap was rising.

1. CORK—QUEENSTOWN.—Mr. W. Osborne.

Gen. Char. of Soil—Marly, with part on limestone.

Alt. and Exposure—30 ft.; suffers most from W. winds.

Rainfall, 1879—41.22 ins.; 14 wet days in May; 21 in June; 20 in July; 17 in Aug.; and 14 in Sept.

Date of Onset and Duration of Frost—Dec. 1st, 25°, for 11 days; after which period there was but little hard frost.

Min. Temps. and Dates—Dec. 2nd, 15°; 5th, 16°.

Plants injured, 1879-80—3 (1), 16 (2), 14 (3)—*Acacia affinis*, 3. *Araucaria excelsa*, 1. *Arundo conspicua*, 3; *A. Donax*, 2. *Benthamia fragifera*, 3. *Camellia*, 3. *Chamærops humilis*, 3. *Cineraria argophylla*, 2. *Clianthus puniceus*, 3. *Colletia cruciata*, 2. *Embothrium coccineum*, 2. *Eucalyptus globulus*, 1. *Eugenia Ugni*, 2. *Euonymus japonicus*, 2; *E. j. varieg.*, 2. *Fabiana imbricata*, 3.

* [No other recorded temps. correspond with this Obs. The Dates of min. temps. for all Ireland, are from Dec. 2nd to 5th. G. H.]

Habrothamnus elegans, 2. *Ilex cornuta*, 2. Laurel, Bay, 2. *Laurus camphora*, 2. *Magnolia grandiflora*, 2. Myrtle, 3. *Olea buxifolia*, 2; *O. excelsa*, 3. Pampas grass, 3. *Phormium tenax*, 2. *Picea religiosa*, 2. *Pittosporum Tobira*, 1. *Toxodium distichum*, 3. *Thamnocalamus Falconii*, 3. *Veronica Andersoni*, 2. *Viburnum Sieboldii*, 3. *Yucca gloriosa*, 3.

Observations—I attribute most of our failures and injuries to the extremely wet seasons of 1879. Though the frost lasted but a few hours on each day, the mischief done to the Bays and other tender shrubs is extraordinary. One plant of *Colletia cruciata* on a slight elevation of only about 9 ft. above the others, and 50 yards distant from them—all being equally exposed—was not injured, while those below were killed to the ground. The *Picea religiosa* had not been previously injured since 1866.

1. TIPPERARY—CLONMEL.—Mr. W. J. Murphy.

Gen. Char. of Soil—Surface of pulverised limestone with granitic portions and Old Red Sandstone.

Alt. and Exposure—800 ft. (?). The town of Clonmel stands in a rich valley sheltered by low hills.

Rainfall, 1879—[Alt., 80 ft.; ht., 1 ft. 4 ins.; 39·33 ins., on 212 days].

Date of Onset and Duration of Frost—Nov. 28th to Dec. 12th.

Min. Temp. and Date—Dec. [5th ?], 15°.

Plants injured, 1879-80—20 (1), 12 (2), 7 (3)—*Aucuba japonica*, 1. *Aloysia citriodora*, 1. *Althæa frutex*, 3. *Arbutus Unedo*, 1, kd. to grd., 2. *Berberis Baelii*, 3. *Benthamia fragifera*, 1. *Calycanthus grandiflorus*, 1. *Ceanothus floribundus*, on wall, 1, elsewhere, 3. *Chimonanthus fragrans*, 3. *Cupressus torulosa*, exposed, 3. *Dahlia*, 1. *Escallonia macrantha*, 1, kd. to grd., 2. *Eucalyptus globulus*, 1, 2. *Eugenia apiculata*, 1. *Euonymus*, vars., *albus* and *aureus*, unprotected, 1, elsewhere, 2. *Francoa ramosa*, 1. *Fuchsias*, on walls, kd. to grd., 2. *Jasminum nudiflorum*, 2. Laurel, Bay, exposed, 1, badly burnt to grd., 2. *Laurustinus*, exposed, 2, others, 3. *Lavandula spicata*, 2. *Lobelia cardinalis*, 1. *Ozothamnus thyrsioides*, 1. Pampas grass, a few unprotected, 1, others, 2. *Penstemons*, 1. *Phormium tenax*, 1. *Punica Granatum*, 2. *Quercus glabra*, 2. *Photinia serrulata*, 3. *Salvia patens*, 1. *Schizostylis coccinea*, 2. *Veronica salicifolia* and vars., all, 1.

DIVISION XXI.—(IRELAND) LEINSTER.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM DUBLIN,
KILDARE, LOUTH, MEATH, WEXFORD AND WICKLOW.

DUBLIN. Rainfall, .5 in. above av. of 10 yrs., owing to excess in summer. In last qr. fall was 5 ins. below av. : total being 28.86 ins., on 208 days. Mean temp., $20^{\circ}7$ below av.; amount of cloud, 10 p. c. above it (Dublin). *Min. temps.*, Dublin (Ordnance Survey Office), alt., 158.8 ft.; Dec. 2nd, $9^{\circ}3$; therm. on grass, below 32° , on 26 nights in Dec.; alt., 162 ft.; Dec. 2nd, $16^{\circ}2$; alt., 51 ft.; Dec. 5th, $21^{\circ}8$: Kingstown, alt., 22 ft.; Dec. 3rd and 5th, 23° .

Plants injured, 1879-80—22 (1), 14 (2), 24 (3), total at 1 place.

KILDARE. Rainfall, 24.42 ins., on 118 days (Maynooth).

Plants injured, 1879-80—6 (1), 2 (2), 4 (3), total at 1 place.

KILKENNY. Rainfall, 31.7 ins. (Inisnag). Aut., wet (Kilkenny).

Plants injured, 1879-80—33 (1), 24 (2), 3 (3), total at 2 places.

LOUTH. Too wet for haymaking and harvest, both very late (Stephenstown).

Plants injured, 1879-80—8 (1), 10 (2), 7 (3), total at 1 place.

MEATH. Severe cold to end of March, the rest of yr., moist and gloomy, without sun (Trim). *Min. rainfall*, Navan, alt., 160 ft.; ht., 1 ft.; 28.97 ins.: max., Trim, alt., 180 ft.; ht., 4 ft. 2 ins.; 33.29 ins., on 159 days. *Min. temp.*, Kells, [Dec. 5th?], 16° .

Plants injured, 1879-80—55 (1), 13 (2), 0 (3), total at 2 places.

WEXFORD. Rainfall, June, July, Aug. and Sept., unusually great; 6.79 ins., above av.; Oct., Nov., Dec., very dry, being 9.75 ins. below av. *Min. rainfall*, New Ross, alt., 100 ft.; ht., 1 ft.; 37.45 ins., on 219 days: max., Enniscorthy, alt., 270 ft.; ht., 1 ft.; 48.42 ins., on 185 days. *Min. temp.*, Gorey, alt., under 100 ft.; Dec. 5th, $18^{\circ}6$.

Plants injured, 1879-80—7 (1), 3 (2), 5 (3), total at 1 place.

WICKLOW. Very cold spring; cold wet summer; Oct., Nov. and Dec., very fine. *Min. rainfall*, Delgany, alt., 220 ft.; ht., 1 ft.; 38.38 ins., on 222 days: max., Enniskerry, alt., 275 ft.; ht., 4 ft.; 44.41 ins., on 212 days. *Min. temps.*, Bray, alt., 300 ft.; Dec. 5th, 6° : Collattin Pk., alt. 416 ft., Dec. 3rd, 10° .

Plants injured, 1879-80—30 (1), 38 (2), 37 (3), total at 4 places.

REPORTS.

1. DUBLIN—DUBLIN, Glasnevin.—Mr. F. W. Moore.

Gen. Char. of Soil—Loam on limestone.

Alt. and Exposure—60 to 80 ft.; exposed on all sides.

Rainfall, 1879—28 ins.

Date of Onset and Duration of Frost—Nov. 30th to Jan. 28th.

Min. Temp. and Date—Jan. 12th, 13°. [*See Met. Obs.*, p. 177].

Plants injured, 1879-80—22 (1), 14 (2), 24 (3)—*Amorpha croceo-lanata*, 1; *A. fragrans*, 1; *A. Lewisii*, 1. *Arbutus Unedo*, 2; *A. U.*, tomentosa, on walls, 3. *Aristolelia Macqui*, 2. *Azalea amæna*, 3; *A. indica*, 3. *Azara Gilliesii*, 3. *Benthamia fragifera*, 3. *Buddleia globosa*, 3. *Camellia*, 3. *Cassinia leptophylla*, 1. *Chamaerops chinensis*, 3; *C. Fortunei*, 3. *Choisya ternata*, 3. *Cordyline Banksii*, 2; *C. indivisa*, 1, 2. *Coronilla valentina*, 1. *Corydalis Banksii*, 5 yrs. old, 1. *Cytisus bracteatus*, 1; *C. tomentosus*, 1. *Drimys Winteri*, on wall, 3. *Edwardsia microphylla*, 3. *Erica arborea*, 1. *Escallonia rubra*, 3. *Eucalyptus globulus*, 1, 2. *Eugenia apiculata*, old plant, kd. to trunk, 3. *Eulalia japonica*, 3. *Euonymus fimbriatus*, on wall and protected, 1. *Fremontia californica*, in sunny situations, 1, in N. aspect, 3. *Garrya microphylla*, on wall, 3. *Genista cinerea*, 1; *G. laburnioides*, 1; *G. præcox*, 1. *Grevillea rosmarinifolia*, 3. *Hypericum oblongifolium*, 2; *H. patulum*, 2. *Ilex furcata*, 2. *Indigofera Dosna* (quite recovered), 2. *Laurel Bay*, 2; *Laurus regalis*, on wall, 2. *Laurustinus*, 1, 2. *Muehlenbeckia complexa*, on wall, 1. *Myrsine undulata*, 1. *Myrtle*, 2. *Ozothamnus rosmarinifolius*, 3. *Pampas grass*, 2. *Pittosporum revolutum*, 1. *Pomegranate*, 3. *Psoralea bituminosa*, 1. *Quercus glabra*, large plant, 1. *Rhododendron arboreum*, 3; *R. barbatum*, 3; *R. Berthelotianum*, 1. *R. Falconeri*, 3; *R. præcox*, 3. *Robinia pyramidalis*, 1. *Roses*, H. P., 1, 2, 3. *Senecio argenteus*, 1; *S. macroglossum*, 1. *Smilax aspera* (quite recovered), 2. *Solanum azureum*, 1. *Ulex stricta*, 1. *Yucca Whipplei*, 2.

1. KILDARE—MAYNOOTH, Carton Park.—Mr. E. Knowldin.

Gen. Char. of Soil—A stiff loam on limestone.

Alt. and Exposure—200 ft.; fairly protected by Beech trees.

Rainfall, 1879 — 24.42 ins., on 118 days; max., 20 ins., July; min., 3 ins., Jan.

Date of Onset and Duration of Frost—Nov. 28th till Feb. 16th; temp. above 32° on 26 days; ice, 11.5 ins. thick.

Min. Temps. and Dates—Jan. 22nd, 8° [Portarlinton, dist., 25 ms., S.E.; Dec. 4th, 12°; Jan. 6th, 21°].

Plants injured, 1879-80—6 (1), 2 (2), 4 (3)—Artichoke, globe, 1. Aucuba, variegated, 2. Broccoli, *e.g.* Leamington, Snow's, &c., 1. Calycanthus floridus, 1. Escallonia macrantha, large plant on rockery, 1, on wall, S.E. asp., 3. Laurel, Bay, 2. Laurel, common, kd. to grd., 2. Laurustinus, kd. to grd., 2. Parsley, 1. Phormium Colensoi, ?, variegated, 3; P. tenax (1878-79), 1. Roses, standards, 3.

Plants uninjured—Coniferæ, including Abies sp., Cedars, Cupressus sp., Pines, Thujas and Sequoias; Roses, dwfs.

1. KILKENNY—STONEFYORD, Inisnag.—Rev. J. Graves.

Gen. Char. of Soil—A warm, light limestone soil.

Alt. and Exposure—224 ft.; exposed to S.

Rainfall, 1879—Alt., 125 ft.; ht., 1 ft.; 31.70 ins.

Date of Onset and Duration of Frost—Three weeks, end of Nov. and beginning of Dec.

Min. Temp. and Date—Dec. [5th ?], 2°.

Plants injured, 1878-79 and 1879-80—6 (1), 8 (2), 2 (3)—Beech, copper, died in spring, 1880, 1. Broccoli, 1878-9, * 1. Buxus balearica, d. in spring 1880, 1. Escallonia macrophylla, 1878-9, 2. Fig, 1878-9, 2. Furze, 1878-9, 2. Hawthorn, no flowers in 1880, 3. Laurel, Bay, 1878-9, 2. Laurel, common, 1878-9, 3. Laurustinus, acute and round leafed, 1878-9, 2. Lonicera, evergreen and varieg., 1878-9, 2. Myrtle, 1878-9, 2. Poplar, Lombardy, 1878-9, 2. Roses (worked), died in spring, 1880, 1. Thuja, d. in sp., 1880, 1. Veronica, 1878-9, 1.

Observations—Laurustinus, many were 25 yrs. old, and never injured before 1878. The round leafed variety seemed to stand the frost better than the acute-leafed, all of which were killed to the ground in 1878.

2. KILKENNY.—Mr. J. G. Robertson.

* The winter of 1878-9 began 3 weeks before Christmas, the min. temp. being on Dec. 24th, 6°.

Gen. Char. of Soil—A good loamy soil, resting on limestone or gravel.

Alt.—200 ft.

Rainfall, 1879—32·32 ins. ; autumn, very wet.

Date of Onset and Duration of Frost—Dec. 2nd for 14 days ; thaw for 1 week ; frost resumed for 4 days.

Min. Temp. and Date—"Said to have been Dec. 24th" [4th ?].

Plants injured, 1879-80—27 (1), 16 (2), 1 (3)—*Aristotelia*, 1. *Aucuba japonica*, exposed, 3. *Benthamia fragifera*, 1. *Buxus balearica*, 1. *Cedrus Deodara*, 1, 2. *Cupressus macrocarpa*, esp. N. side, 2 ; *C. sempervirens*, 2 about 50 years, 1. *Cistus*, gum, 1. *Daphne Laureola*, 1, 2 ; *D. Mezereum*, 1. *Erica mediterranea*, 1. *Euonymus*, 1, 2. Figs, 1878-79, 2. Furze, fl. pl., 1. *Jasminum revolutum*, 1. Laurel, Bay, 1, 2. Laurel, common, 2. *Laurustinus*, young, 1, old, 2. Lavander, 1, 2. *Libertia formosa*, 1. *Lonicera brachypoda*, aureo-retic., 1, kd. to grd., 2. Myrtles, broad-leaved, 1, kd. to grd., 2. Olive, 1. Pampas grass, 1, 2. *Phormium tenax*, 1, 2. *Pinus insignis*, 1. *Quercus ilicifolia*, young shoots kd., esp. on N. side, 2. Rosemary, 1. *Taxodium* sp., 1. *Veronica*, shrubby, 1. *Yucca*, 1, 2.

1. LOUTH—CASTLE BELLINGHAM.—Mr. E. Donnan.

Gen. Char. of Soil—A strong clay.

Alt.—50 ft.

Rainfall, 1879—[Dundalk, dist., 6 ms., N. : (Farndreg), alt., 90 ft. ; 35·77 ins. : (Ravensdale Pk.), alt., 360 ft. ; 51·60 ins., on 179 days].

Plants injured, 1879-80—8 (1), 10 (2), 7 (3)—*Aloysia citriodora*, of 20 yrs., agst. wall, 1. Apples, 2, 3. *Aucuba japonica*, 2. *Cercis siliquastrum*, 3. *Chamærops Fortunei*, 1. Cherry, 2. *Eucalyptus coccifera*, 2 ; *E. globulus*, 1 ; *E. longifolia*, 1. *Euonymus latifolius*, aureus, 3. *Hydrangea japonica*, kd. to grd., 2. *Hypericum*, 3. *Jasminum himalayicum*, 1. Laurel, Bay, 2. *Laurustinus*, 2. Myrtle, 3. Pear, 3. Roses, stands., 3. *Ruscus aculeatus*, 2. *Sabal* [Palmetto ?], 1. *Tritoma uvaria*, 1, 2. *Veronica*, varieg., 1. *Vinca*, all variegated, 2.

1. MEATH—KELLS, Balrath House.—Mr. J. C. Durno.

Gen. Char. of Soil—A rich loam with an open subsoil.

Alt. and Exposure—Country flat.

Rainfall, 1879—[Navan, dist., 10 ms.; alt., 160 ft.; 28·97 ins.].

Duration of Frost—Six weeks.

Min. Temp. and Date—[Dec. 5th ?], 16°.

Plants injured, 1879-80—34 (1), 8 (2), 0 (3)—*Agathæa cœlestis*, 1. *Aponogeton distachyon*, 1. *Aralia japonica*, 1. *Arbutus*, sorts, 2. *Arundo Donax*, 1. *Boltonia latisquama*, 1. *Broccoli*, 2. *Calceolaria chelidonioides*, 1. *Castilleja indivisa*, 1. *Catananche bicolor*, 1; *C. cœrulea*, 2. *Celery*, 2. *Centaurea gymnocarpa*, 1. *Clematis calycina*, 2. *Commelyna cœlestis*, 1. *Dracocephalum argunense*, 1; *D. canariense*, 1. *Eupatorium purpureum*, 1. *Farfugium grande*, 1. *Fuchsias*, 2. *Gunnera scabra*, 1. *Oenothera macrocarpa*, 1. *Paris grandifolia*, 1. *Parochetus communis*, 1. *Platycodon grandiflorum*, 1. *Plumbago Larpentæ*, 1. *Primula cashmeriana*, 1; *P. purpurea*, 1; *P. rosea*, 1. *Pyrola rotundifolia*, 1. *Roses*, 8 p. c., 1. *Rudbeckia atosanguinea*, 1; *R. pulcherrima*, 1. *Schizostylis coccinea*, 1. *Solanum jasminoides*, 1. *Stachys coccinea*, 1. *Tagetes lucida*, 1. *Tritoma aurea*, 1. *Yucca filamentosa*, 2; *Y. recurvata*, 2. *Zephyranthes candida*, 1.

Plants uninjured—*Abelia rupestris*, *A. uniflora*, *Amorpha angustifolia*, *A. crocea*, *A. glabra*, *Andromeda floribunda*, *A. polifolia*, *Anona triloba*, *Aralia intermedia*, *Aristotelia Macqui*, *Aronia floribunda*, *A. grandiflora*, *Azalea indica alba*, *amæna*, *liliflora*, `souvenir de l'Exposition'; *Azara integrifolia*, *Bignonia grandiflora*, *Bridgesia spicata*, *Berberis Bealii*, *B. Darwinii*, *B. dulcis*, *B. empetrifolia*, *B. purpurea*, *B. stenophylla*, *B. Wallichianum*, *Calycanthus floridus*, *Caparis spinosa*, *Caragana pendula*, *Castanea chrysophylla*, *Ceanothus americanus*, *C. azureus*, *C. divaricatus*, *C. grandiflorus*, *Celastrus scandens*, *Cercis siliquastrum*, *Chamærops Fortunei*, *Chimonanthus fragrans*, *C. virginica*, *Clethra alnifolia*, *Cornus mascula*, *Coronilla Emerus*, *Cotoneaster affinis*, *C. frigida*, *C. microphylla*, *C. Simmondsii*, *Cratægus* sorts planted in open, *Cydonias* in clumps, *Daphne Blagayana* and sorts, *Desmodium penduliflorum*, *Deutzia canadensis*, *D. candidissima*, *D. crenata*, *D. Fortunei*, *D. gracile*, *D. scabra*, *D. stamina*, *Elæagnus angustifolia*, *Embothrium coccineum*, *Escallonia Ingrami*, *E. macrantha*, *E. rubra*, *E. serrata*, *Euonymus atropurpureus*, *E. europæus*, *E. japonicus*, *E. latifolius*, *E. radicans*, *Eurybia Gunniana*, *E. ilicifolia*, *Fabiana imbricata*, *Forsythia Fortunei*, *F. suspensa*, *F. viridissima*, *Garrya elliptica*, *Gaultheria procumbens*, *Genista præcox*, *G. sagittalis*, *Gledits-*

chia triacanthos, Griselinia littoralis, Halesia diptera, Helianthus, "superb" &c., Hibiscus sorts, Hydrangea grandiflora, H. nivea, Hypericum Kalmianum, H. punctatum, H. quadrangulare, Idesia polycarpa, Illicium, Indigofera Dosua, Itea virginica, Kalmia glauca, Kerria japonica, Kolreuteria, Ledum palustre, Ligustrum japonicum, L. sinense, Lonicera fragrantissima, L. Ledebourii, L. sempervirens, L. tartarica, Mahonia, sorts, Menispermum canadense, Menziesia polifolia, Nuttallia cerasiformis, Osmanthus ilicifolius, O. rosmarinifolius, Pernettya angustifolia, P. mucronata, P. speciosa, Philadelphus grandiflorus, P. speciosissima, Phillyrea angustifolia, P. latifolia, Potentilla floribunda, Pterocarya caucasica, Punica Granatum, and sorts, Pyrus japonicus, Rhamnus alaternus, R. alpinus, Rhodotypos Kerrioides, Rhus Cotinus, R. glabra lanceolata, Ribes aureus, R. sanguineus, R. speciosus, Sambucus aurea, Shepherdia argentea, Skimmia japonica, Sophora japonica pendula, Spiraea arriæfolia, S. bella, S. callosa, S. Douglasii, S. levigata, S. Lindleyana, S. prunifolia, S. thunbergia, S. trilobata, S. ulmifolia, Veronica angustifolia, V. salicifolia, Virgilea lutea, Weigela, sorts.

2. MOYNALTY, Kingsfort.—Mr. R. Tanham.

Gen. Char. of Soil—Sandy and gritty ; subsoil easily improved.

Alt. and Exposure—Well sheltered.

Rainfall, 1879—[Navan, dist., 15 ms. ; alt., 160 ft. ; 28·97 ins.].

Plants injured, 1879-80—15 (1), 5 (2), 0 (3)—Artichoke, globe, 1 ; A. "Thistle," 2. Escallonia macrantha, 1 ; E. rubra, 1. Figs, 1. Gladiolus cardinalis, 1. Jasminum, white and yellow, 1. Lobelia cardinalis, 2. Myrtle, 1. Pea, sweet, 1. Roses, Briars of stands, 2 ; Madame Villermoz, 1 ; Maréchal Niel, 1 ; President, 1 ; Solfaterre, 1 ; Celine Forestier, 2 ; Triomphe de Rennes, 2. Schizostylis coccinea, 1. Tritoma aurea, 1 ; T. uvaria, 1.

1. WEXFORD—GOREY, Knockmullen.—Miss M. Owen.

Gen. Char. of Soil—Friable and dry, on a gravelly subsoil.

Alt. and Exposure—Considerably under 100 ft. ; sheltered.

Rainfall, 1879—[Courtown, Gorey, alt., 80 ? ft. ; 40·15 ins., on 205 days].

Min. Temp. and Date—Dec. 5th, 18°·6.

Plants injured, 1879-80 — 7 (1), 3 (2), 5 (3) — Aloysia citriodora, 1. Anemone fulgens, 3. Aucuba japonica, 3. Canna indica, 1878-9, 1. Coronilla glauca, 1878-9, 1. Dablias, 1. Lobelia ful-

gens, 1878-9, 1. Myrtle, 1, 2. *Opuntia Rafinesquiana*, 2. *Passiflora coerulea*, 1. *Primula Fortunei*, *erosa*, 3. Roses, Banksian, yellow, 2; Solfaterre, many years old, 1; Tea 'Magnolia,' 1. *Sedum carneum*, 1. *Senecio mikanoides*, 1878-9, 1. *Tropæolum tuberosum*, 1878-9, 1. *Weigela rosea*, 3. *Yucca filamentosa*, 3.

Plants uninjured—*Aloysia citriodora* (one small plant), *Anomotheca cruenta*, *Arbutus*, *Begonia discolor*, *Cordilyne australis*, *Crinum capense*, Dahlias (a few), *Fabiana imbricata*, *Fragaria indica*, *Fuchsia procumbens*, *F. minima*, Bay Laurel, common Laurel, *Laurustinus*, *Libertia grandiflora*, *Lobelia repens*, *Mesembrianthemum uncinatum*, *Muehlenbeckia*, *Nertera depressa*, *Oxalis floribunda*, *Rhododendron ciliatum*, Roses (Gloire de Dijon, Maréchal Neil, Tea), *Salvia patens*, *Sarracenia Drummondii*, *Saxifraga sarmen-tosa*, *Sedum carneum variegatum*, *Vittadinia triloba*, *Zauschneria californica*.

1. WICKLOW—BRAY, Hollybrook.—Mr. W. Burne.

Gen. Char. of Soil—Light and loamy.

Alt. and Exposure—300 ft.

Rainfall, 1879—[Bray, alt., 250 ft.; 42·09 ins., on 201 days].

Min. Temp. and Date—Dec. 5th, 6°.

Plants injured, 1879-80—4 (1), 8 (2), 4 (3)—Artichokes, globe, 2. Broccoli, 3. *Ceanothus azureus*, 1. *C. microphyllus*, 1. *Erica mediterranea*, 2. *Eucalyptus*, 1, 3. *Euonymus europæus*, 3. *Fuchsia*, various, kd. to grd., 2. *Hydrangea japonica*, kd. to grd., 2. Laurel, Bay, 3. *Laurustinus*, kd. to grd., 2. Lettuce, 2. Peaches, on open walls, 2. Roses, hybrid China, 1, 2.

2. BRAY, Powerscourt.—Mr. W. Forbes.

Gen. Char. of Soil—Light, with a gravelly subsoil.

Alt. and Exposure—About 400 ft.

Rainfall, 1879 — [Bray (Fassaroe), dist., 4ms.; alt., 250 ft.; 42·09 ins.].

Min. Temp. and Date—Dec. [5th ?], 15°.

Plants injured, 1879-80—3 (1), 7 (2), 8 (3)—*Aralia neriifolia*, 3. *Benthamia fragifera*, 3. *Chamærops excelsa*, 3. *Cordylina indivisa*, 1; sheltered, 3. *Desfontainea spinosa*, 2. *Eucalyptus*, 1. *Euonymus aureus*, 2. *Fuchsia Riccartoni*, 2. *Hydrangeas*, 2. *Laurustinus*, 3. *Phormium tenax*, strong plants in rich soil, 2; in light soil and well exposed, 3. *Pinus insignis*, 3. *Rhus glabra*,

laciniata, 3. Roses, 2. Veronica Andersoni, 1; on rockery, 2.

Plants uninjured—Aralia Sieboldii, 10 feet diam., Chamærops excelsa, Mitraria coccinea, Phormium tenax variegatum.

3. RATHDRUM, Westaston.—Mr. W. Haughton.

Gen. Char. of Soil—A strong loam on a subsoil of yellow clay.

Alt. and Exposure—450 ft.; exposed to E.

Rainfall, 1879—161 days of rain from July 1st, 1879, to July 1st, 1880.—[Bray, dist., 25 ms.; alt., 250 ft.; 42·09 ins.].

Date of Onset and Duration of Frost—Nov. 26th, with snow and frost to Dec. 11th.

Min. Temp. and Date—[Hollybrook, Bray, dist., 20 ms., N.; Dec. 5th, 6°: Collattin Pk., dist., 12 ms., S.E.; Dec. 3rd, 10°].

Plants injured, 1879-80—15 (1), 11 (2), 21 (3)—Aster argophyllus, 2. Abelia floribunda, 3; A. rupestris, 3. Aralia, 1. Azalea indica, 3. Benthamia fragifera, 3. Broussonetia papyrifera, 2. Calla æthiopica, 1. Ceanothus, vars., 2, 3. Cedrus, Bergoni, 2. Choysia ternata, 1. Chianthus puniceus, 1. Cordyline australis, 2. Coronœa ferruginea, 2. Cryptomeria alba, 2. Cupressus lusitanica, 3. Dicksonia antarctica, 1. Edwardsia microphylla, 2, 3. Erica arborea, 3. Eucalyptus globulus, 1, 2, 3. Fagus Cunninghamii, 3. Gnaphalium lanatum, 1. Gynierium jubatum, 1. Habrothamnus elegans, 1. Ilex cornuta, 3. Jamesia americana, 3. Jubæa spectabilis, 1. Laurel, Bay, narrow-leaved, 3. Libocedrus Doniana, 2. Ligustrum japonicum, 1. Magnolia grandiflora, 3. Olea excelsa, 3; O. europæa, 1. Oenothera japonica, 2. Oreodaphne californica, 1. Phormium tenax, 3. P. t. variegatum, 3. Pittosporum Tobira, 1. Quercus Suber, 3. Rhododendron Edgeworthii, 3. R. Thiboudiense, 3; R. virginalis, 3. Viburnum awa-furki, 1.

4. SHILLELAGH, Coollattin Park.—Mr. J. Whytock.

Gen. Char. of Soil—Poor, being destitute of lime and resting on shingle.

Alt. and Exposure—416 ft.; mostly exposed to E. and W.

Rainfall, 1879—[Carlow, dist., 17 ms.; alt., 291 ft.; 35·96 ins., on 209 days].

Min. Temp. and Date—Dec. 3rd, 10°.

Plants injured, 1879-80—8 (1), 12 (2), 4 (3)—Arbutus Unedo, 1. Aucuba japonica, 3. Bignonia, 1. Cedrus Deodara, 2. Escallonia macrantha, 2. Eucalyptus globulus, 1. Euonymus, aureo-variegatus,

2. Furze, 2. *Hydrangea japonica*, 2. Laurel, Bay, 1. Laurel, common, 3. *Laurustinus*, 2. *Leycesteria formosa*, 2. *Lonicera flexuosa*, 2. *Magnolia grandiflora*, 2. Myrtle, 1. Pampas grass, 2. *Phormium tenax*, 1. *Pinus excelsa*, 3. Roses, Macartney and Tea, 2. *Ruscus aculeatus*, 2. *Sequoia gigantea*, 3. *Veronica*, variegated, 1.

DIVISION XXII.—(IRELAND) CONNAUGHT.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM GALWAY,
MAYO AND SLIGO.

GALWAY. Great absence of sun during the summer; very dry after Sept. (Cregg Pk.). Spring and winter, the driest seasons (Kilconnel). Summer cold and wet (Tuam). *Min. rainfall*, Tuam, alt., 136 ft.; ht., 6 ft. 3 ins.; 33·34 ins.: max., Clifden, alt., 105 ft.; ht., 1 ft.; 75·92 ins., on 236 days. *Min. temp.*, Ballinasloe, alt., 161 ft.; Dec. 5th, 12°: Galway [alt., 30 ft. ?], Dec. 5th, 19°.

MAYO. Remarkable absence of heat in sum. and aut.; harvest, a month late (Westport). *Min. rainfall*, Hollymount (Cloona Castle), alt., 120 ? ft.; ht., 2 ft.; 37·50 ins.: max., Crossmolina, (Enniscoe), alt., 50 ? ft.; ht., 11 ins.; 51·31 ins., on 238 days.

SLIGO. *Rainfall*, greatest in sum. months; Nov. the driest (Markree Castle). *Min. temps.*, Markree Castle, alt., 132 ft.; Dec. 2nd, 16°: Mullaghmore, alt., 36 ft.; Dec. 5th, 28°.

Plants injured, 1879-80—28 (1), 26 (2), 6 (3), total at 1 place.

REPORTS.

1. **SLIGO—COLLOONEY**, Markree Castle.—Mr. J. Mcphail.

Gen. Char. of Soil—A great variety, but in and about the garden, a stiff calcareous loam on limestone rock.

Alt.—132 ft.

Rainfall, 1879—30·85 ins. [Markree Obs., alt., 110 ft.; ht., 6 ins.; 39·71 ins.].

Date of Onset and Duration of Frost—Occasionally, from Sept. 24th to June 11th, 1880.

Min. Temps. and Dates—[Dec. 2nd, 16°: Mullaghmore, dist., 20 ms., N.; alt., 36 ft.; Dec. 5th, 28°].

Plants injured, 1879-80—28 (1), 26 (2), 6 (3)—Almond, 2.

Aralia Sieboldii, 2; *A. spinosa*, 2. *Arbutus Unedo*, 2. *Artichoke*, globe, 2. *Arundo conspicua*, 1; *A. Donax*, variegata, 1. *Berberis Darwinii*, 2; *B. Jamesonii*, 2. *Broussonetia papyrifera*, 3. *Buddleia globosa*, 1. *Buxus rotundifolia*, 1. *Catalpa syringæfolia*, 2. *Ceanothus*, flore albo, 1. *Cedrus Deodara*, 2. *Cordyline australis*, 1; *C. gracilis*, 1. *Cotoneaster microphylla*, 2. *Cupressus macrocarpus*, 1. *Erica mediterranea*, 2. *Escallonia Balfourii*, 2; *E. macrantha*, 1. *Euonymus japonicus*, 1. *Forsythia viridissima*, 3. *Fuchsia Riccartoni*, 3. *Griselinia littoralis*, 1. *Hydrangea hortensis*, 2. *Hypericum oblongifolium*, 2. *Jasminum officinale*, 3; *J. revolutum*, 2. *Laurel*, Bay, 2. *Laurel*, common, 3. *Laurustinus*, 2. *Leycesteria formosa*, 1. *Ligustrum japonicum*, 1. *Liquidambar styraciflua*, 1. *Magnolia ferruginea*, 1. *Marrubium vulgare*, 1. *Olea ilicifolia*, 1. *Olearia Haastii*, 2. *Osmanthus argenteus variegatus*, 1; *O. ilicifolius*, 1. *Pampas grass*, 1. *Phormium tenax*, 1. *Punica Granatum*, 1. *Quercus Ilex*, 2. *Richardia æthiopica*, 1. *Roses*, stands., H. P.'s, Teas, China, 2. *Ruscus aculeatus*, 1. *Salvia officinalis*, 2. *Sequoia sempervirens*, 2. *Skimmia japonica*, 2. *Sophora pendula*, 1. *Thyme*, 2. *Tritoma uvaria*, 2. *Veronica Andersoni*, 1; *V. salicifolia*, 1; *V. Traversii*, 3. *Yucca filamentosa*, 1; *Y. recurva*, 2.

DIVISION XXIII.—(IRELAND) ULSTER.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1879 FROM ANTRIM,
ARMAGH, DONEGAL AND MONAGHAN.

ANTRIM. Weather, severe in early part of the year; spring, very backward and cold; aut., cold and wet (Belfast). *Min. rainfall*, Bushmills, alt., 33 ft.; ht., 1 ft.; 29·56 ins., on 195 days: max., Belfast (New Barnsley), alt., 200 ft.; ht., 1 ft.; 42·91 ins., on 202 days. *Min. temp.*, Aghalee, alt., 110 ft.; Dec. 5th, 14°.

Plants injured, 1879-80—5 (1), 8 (2), 3 (3), total at 2 places.

ARMAGH. *Rainfall*, excessive in sum., and very prejudicial to crops (Edward St. Station): min. rainfall, Armagh Obs., alt., 208 ft.; ht., 1 ft. 7 ins.; 32·27 ins., on 202 days: max., Flurrybridge, alt., 340 ft.; ht., 1 ft.; 44·12 ins., on 153 days. *Min. temps.*, Armagh (Palace), Dec. 4th, 8°: Armagh, alt., 206 ft.; Dec. 2nd, 17°·6: Loughgall, alt., 207 ft.; Jan. 22nd, 16°·7.

Plants injured, 1879-80—21 (1), 11 (2), 5 (3), total at 2 places.

DONEGAL. Temp., extremely low in early winter and spring; sum., cold and wet: *Rainfall*, not excessive, Raphoe (Convoy House). First four months, dry but cold; sum., wet, stormy and cold. Oct. and Nov., fine, Ramelton (Killygarvan). *Min. rainfall*, Ramelton (Ballyare), alt., 60 ft.; ht., 1 ft.; 34·59 ins., on 217 days: max., Inver, alt., 100 ft.; ht., 1 ft.; 42·65 ins. *Min. temp.*, Ballymacool, alt., 200 ft.; [Dec. 4th ?], 14°.

Plants injured, 1879-80—12 (1), 12 (2), 10 (3), total at 1 place.

MONAGHAN. *Rainfall*, severe (Glaslough). *Min. temp.*, Dec. 12th [2nd ?], 12°.

Plants injured, 1879-80—12 (1), 12 (2), 10 (3), total at 1 place.

TYRONE. *Rainfall*, about the av., yet it did much injury, as the greater part fell when not wanted (Stewartstown). *Min. rainfall*, Caledon Glebe, alt., 125 ft.; ht., 1 ft.; 30·39 ins.: max., Beragh (Clogherny), alt., 434 ft.; ht., 1 ft.; 42·14 ins. *Min. temps.*, Omagh, Dec. 1st, 6°; Jan. 21st, 1880, 14°: Lissan, alt., 305 ft.; Dec. 2nd, 19°.

REPORTS.

1. ANTRIM—LARNE, Garton Tower.—Mr. G. Porteous.

Gen. Char. of Soil—A dark calcareous loam.

Alt. and Exposure—300 ft. ; exposed chiefly to N.E. winds.

Rainfall, 1879—Above av. [Larne (Carnlough), dist., 15 ms., S. ; alt., 8 ft. ; ht., 1 ft. ; 38.72 ins., on 191 days].

Min. Temp.—[Aghalee, dist., 35 ms., S. ; alt., 110 ft. ; Dec. 5th, 14°].

Plants injured, 1879-80—*Abies excelsa*, 2. *Veronicas*, 6ft. high, 2.

Plants uninjured—*Eucalyptus globulus*, 50 ft.

Observations—Spruce firs have suffered most ; trees from 20 to 30 yrs. old have not more than an inch of green on the tops and branches. Shrubs were not injured by the frost of 1878-79 or of 1879-80. Far more injury was done by the N.E. gales from the sea.

2. ANTRIM, Shane's Castle.—Mr. T. Seaton.

Gen. Char. of Soil—Heavy and retentive.

Alt. and Exposure—Low and well sheltered, by the side of Lough Neagh.

Rainfall, 1879—[Mean for Co. Antrim (9 stations), 36.34 ins.].

Min. Temp. and Date—[Aghalee, dist. 12 ms., S. ; alt., 110 ft. ; Dec. 5th, 14°].

Plants injured, 1879-80—5 (1), 6 (2), 3 (3)—Apples, 3. *Arbutus*, 1. *Aucuba japonica*, 3. Broccoli, 1. *Cedrus Deodara*, 2. Clematis, 2. Escallonia, 2. *Eucalyptus*, 1. Laurel, common, 2 ; L. Portugal, 3. Peaches, 1. Roses, 1, 2. Vegetables of all kinds, 2.

Observations—Fruit, in 1879, was very poor, Apples and Pears, small and worthless ; but plums on walls were a good crop, also Gooseberries and other small fruits were equally good. In 1880, there were no Apples, Pears or Plums. Currants and Gooseberries, not quite so fine a crop as Strawberries, but fine in quality.

1. ARMAGH—ARMAGH, Loughgall.—Mr. J. Brennan.

Gen. Char. of Soil—Clay prevails, but also gravelly and sandy soils exist.

Alt. and Exposure—207 ft. (Armagh Obs.).

Rainfall, 1879—33 ins.

Date of Onset and Duration of Frost—End of Nov. to middle of Feb.

Min. Temps. and Dates—Jan. 22nd, $16^{\circ}\cdot7$ [Warrington, dist., 10 ms., N.E.; alt., 191 ft.; Dec. 4th, 12° (with hard frost from 1st to 13th); Jan. 20th, 13° : Donaghadee, dist., 45 ms, E. (on coast); alt., 37 ft.; Dec. 5th, 20°].

Plants injured, 1879-80 — 13 (1), 8 (2), 4 (3) — Agapanthus umbellatus, 3. Apples, Golden Pippin and Ripston in wet soils, as well as all old trees, 2. Arbutus, of sorts in any soil, 2. Aucuba japonica, 3. Berberis Darwinii, in wet soil, 1. Broccoli, Snow's Winter and Walcheren, 1; Snow's Winter and Backhouslake, 2; Sutton's late Queen, 3. Cotoneaster microphylla, 2. Erica alba, 2; E. australis, 1. Euonymus japonicus, all vars., unprotected, 1. Fuchsia coccinea, 1. Jasminum multiflorum, 1. Laurel, Portugal, in warm situation and loose soil, 2. Laurustinus, in wet clay, 1; drained, 2; light soil and sheltered from N., 3. Leycesteria formosa, wet clay soil, 1. Lobelia cardinalis, 1. Lonicera, aureo-reticulata, 1. Pernettya mucronata, cold wet soil, 1. Roses, nearly all H. P., 2. Veronicas, shrubby, 1. Wallflower, 1.

Plants uninjured—Coniferæ of every kind with one exception.

2. ARMAGH, Palace.—Mr. T. Sheasby.

Gen. Char. of Soil—A rich and rather heavy or strong loam, on a subsoil of clay.

Alt. and Exposure—Kitchen garden very low and badly drained, but well sheltered; pleasure grounds are much higher.

Rainfall, 1879—[Armagh Obs., alt., 208 ft.; ht., 1 ft. 7 ins.; 32·27 ins., on 202 days].

Date of Onset and Duration of Frost—Nov. 24th to Dec. 25th [5th?]; Jan. 13th to 27th.

Min. Temp. and Date—Dec. 4th, 8° [Armagh, alt., 206 ft.; Dec. 2nd, $17^{\circ}\cdot6$].

Plants injured, 1879-80—8 (1), 3 (2), 1 (3)—Aucuba japonica, 1, 2. Broccoli, 1. Cabbage, 1. Fig, 1, 2. Laurel, Bay, 1. Laurel, common, 3. Laurustinus, 1. Pampas grass, 1. Roses, chiefly stands., 1, others, 2.

Plants uninjured—Conifers, stood remarkably well.

Observations—The late spring and wet summer of 1879 were very unfavourable for fruit trees. Apples and Pears were a total failure in 1880; having scarcely any bloom.

1. DONEGAL—LETTERKENNY, Ballymacool.—Mr. C. Fergusson.

Gen. Char. of Soil—A heavy, wet and cold clay.

Alt. and Exposure—200 ft.; much exposed to winds from Glen Swilly and from E.

Rainfall, 1879—Rains constantly from Atlantic. [Convoy Ho., Raphoe, dist., 6 ms., S.E.; alt., 110 ft.; 38·30 ins., on 244 days].

Min. Temps. and Dates—[Dec. 3rd or 4th?], 14° [Londonderry, dist., 18 ms., N.E.; alt., 93 ft.; Dec. 4th, 16°: Buncrana, dist., 18 ms., N.N.E.; alt., 20 ft.; Dec. 3rd, 20°].

Plants uninjured, 1879-80—I may safely say we had no damage done here by frost last winter, though the growth of many trees and shrubs was not quite so good last summer as usual. *Araucaria*, we have a fine specimen, about 50 ft., in perfect health. Instead of the usual growth of about 15 inches, it only grew 8 or 9 inches last summer. *Chamærops excelsa*, a tree over 6 ft., growing quite exposed, stood the frost well and sent out the usual number of leaves this summer; but their stalks are only half the usual length. *Conifers*, all stood well. *Desfontainea spinosa*, large plants stood the winter quite unprotected, grew and flowered very well this summer. *Rhododendron barbatum* and other early flowering sorts, never flowered better than during last spring (1880).

1. MONAGHAN—MONAGHAN, Glaslough.—Mr. Wm. Swanborough.

Gen. Char. of Soil—A medium loam passing into a blue clay.

Alt. and Exposure—Possibly 100 ft.; in an enclosed valley.

Rainfall, 1879—Rainfall in great quantities [Rockcorry, dist., 15 ms., S.; alt., 290 ft.; 35·31 ins., on 187 days].

Date of Onset and Duration of Frost—Dec. 1st to 15th; with short period in Jan., 1880.

Min. Temps. and Dates—“About Dec. 12th” [2nd?], 12° [Colebrooke Pk., dist., 18 ms., W.; alt., 230 ft.; Dec. 5th, 9°: Omagh, dist., 25 (?) ms., N.W.; Dec. 1st, 6°; Jan. 21st, 14°: Lissan, dist., 25 (?) ms., N.; alt., 305 ft.; Dec. 2nd, 19°].

Plants injured, 1879-80—12 (1), 12 (2), 10 (3)—*Arbutus*, 1. *Arundo Donax*, 1, 2. *Aucuba*, all kinds, 1, 2, 3. *Bambusa*, 1, 2. *Biota orientalis*, 3. *Carnations*, 1, 2. *Cedrus Deodara*, 2; *C. Libani*, 2. *Cephalotaxus Fortunei*, masculus, 1. *Cryptomeria Lobbii*, 3; *C. japonica*, 3. *Gladiolus*, 1. *Holly*, choice kinds, 3. *Hollyhocks*, 1. *Juniperus chinensis*, 2; *J. prostrata*, 3. *Laurel*, Bay,

1, 2. Laurustinus, 1, 2. Pampas grass, 1, 2. Picea lasiocarpa, 3 ;
P. Pinsapo, 3. Pinus excelsa, 2 ; P. insignis, 1. Retinospora ob-
tusa, 3. Roses, 1, 2. Taxodium sempervirens, 3.

DIVISION I.—(ENGLAND) MIDDLESEX.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN.
1881, FROM MIDDLESEX.

Jan., mild at first, then frosty, cold and dry to end; 26 days of frost. Feb., rainy; March, seasonable; spring being promising and remarkable for luxuriant crops of vegetables, but little promise of fruit. July, rainy; changeable to mid. of Sept., followed by heavy rainfall. Close hot weather succeeded; Sept. 4th, 84°. Oct., cold and rainy, with severe snow-storm on 20th. Nov., unsettled and rainy with 14 nights of frost (Isleworth). Dec., first 12 days, fine and mild; excepting 2 days, rain every day to end of month; total, 1 in. above av. of 8 yrs. (Muswell Hill). Jan., 1881, dull, hazy or clear; temp., mostly above 32°, till 12th. Very great snow-storm and gale, Jan. 18th, with severe weather till 26th. Thaw. *Min. rainfall*, 1880, Westminster, alt., 95 ft.; ht., 66 ft. 4 ins.; 24.70 ins., on 146 days: max., Uxbridge (Harefield Pk.); alt., 296 ft.; ht., 8 ins.; 34.11 ins., on 143 days. *Min. temps.*, 1881, Isleworth, alt., 68 ft.; Jan. 17th, 40.6: Chiswick, Jan. 17th, 50: Harrow [alt., 400 ft. ?], Jan. 15th, 70: Chelsea, Jan. 17th, 80: Finchley, alt., 275 ft.; Jan. 15th, 80.4; Regent's Park, alt., 125 ft.; Jan. 15th, 90.8: Hornsey, alt., 125 ft.; Jan. 17th, 100: Camden Sq., alt., 111 ft.; Jan. 17th, 110.8: Hackney, alt., 59 ft.; Jan. 17th, 120.6.

Plants injured, 1880-81—9 (1), 12 (2), 10 (3), total at 1 place.

REPORTS.

1. EALING, Castle Bar.—Dr. M. T. Masters, F.R.S.

Gen. Char. of Soil—Stiff London clay.

Alt. and Exposure—250 ft.; N.W.

Rainfall, 1880—[Alt., 134 ft.; ht., 27 ft.; 26·79 ins., on 163 days].

Date of Onset and Duration of Frost—[Severe frost began Jan. 12th, 25°; lasting till Jan. 26th, 15° (Blackheath, Regent's Pk., &c.)].

Min. Temps. and Dates—[Chiswick, R. H. S. Gard., dist., 3 ms.; Jan. 17th, 5°; Chelsea, Bot. Gard., dist., 8 ms.; Jan. 14th and 17th, 8°; 20th, 12°].

Plants injured, 1880-81—9 (11), 12 (2), 10 (3)—*Abies Smithiana*, 3. *Aucuba japonica*, 3. *Buddleia globosa*, fine plant, agst. wall, 23 yrs. old, 1. *Clematis flammula*, 2; *C. Jackmanni*, 3. *Colletia cruciata*, 1. *Edwardsia microphylla*, 1. *Elæagnus pungens*, 3. *Escallonia rubra*, 1. *Euonymus japonicus*, 1. *Hedera colchica*, 2. *Hypericum calycinum*, 2. *Iberis Tenoreana*, 2; *T. gibraltica*, 1. *Laurel*, common, 3. *Ligustrum ovalifolium*, 3. *Phygelius capensis*, 1. *Quercus humilis*, 3. *Roses*, Baroness Rothschild, 2. *Céline Forestière*, 2; *Climbing devoniensis*, 2. *Duke of Edinburgh*, 2; *Eliza Boll*, 2; *Indica*, 3. *Jules Margottin*, 3; *La France*, H. P., 2; *Madame La Charme*, 3. *Marie Baumann*, 1; *Pierre Notting*, 2; *Souvenir de Malmaison*, 2; *Xavier Olibo*, H. P., 1.—*Ruta graveolens*, varieg., 2. *Sedum Sieboldii*.

DIVISION II.—S. E. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881, FROM BERKSHIRE, HAMPSHIRE, ISLE-OF-WIGHT, KENT, SURREY AND SUSSEX.

BERKS. Jan., Mch., May and Aug., very dry ; June, July, Sept. and Oct., much wetter than av. ; largest total av. since 1852 (Long Wittenham). Oct., mild and wet to 13th ; Dec., lovely weather (Purley). *Min. rainfall*, Wallingford, alt., 175 ft. ; ht., 9 ins. ; 29·12 ins., on 133 days : max., Reading (Englefield), ht., 1 ft. 1 in. ; 37·71 ins., on 154 days. *Min. temp.*, Purley, Jan. 17th, 1881, 0° : East-hampstead, alt., 255 ft. ; Jan. 17th, 4°.

Plants injured, 1880-81—17 (11), 38 (2), 4 (3), total at 2 places.

HANTS. Year remarkable for E. winds with rain ; of 170 days of rain, 61 occurred with E. wind (Christchurch). Dry cold spring ; aut., very mild (Arlesford). First half of yr. dry ; latter half, wet (Blackwater, Strathfieldsaye). *Min. rainfall*, Dogmersfield Pk., 28·93 ins. : max., Petersfield, alt., 216 ft. ; ht., 1 ft. ; 37·64 ins., on 131 days. *Min. temps.* (N. Hants), Basing Pk., Jan. 16th, 3° : Strathfield Turgiss, alt., 195 ft. ; Jan. 22nd, 3°·9 : Alton, Jan. 17th, 6° : Swarraton, alt., 310 ft. ; Jan. 17th, 6°·1 : (S. Hants), Highfield, alt., 140 ft. ; Jan. 24th, 8°·1 : Southampton, O. S. O., Jan. 15th, 13°·2 : Woolston, alt., 83 ft. ; Jan. 24th, 8°·4 : Portsmouth, alt., 20 ft. ; Jan. 22nd, 7°·4 : Hurst Castle, alt., 14 ft. ; Jan. 22nd and 23rd, 15° : Bournemouth, alt., 184 ft. ; Jan. 22nd, 11°·2 : Sth. Bourne, alt., 90 ft. ; Jan. 24th, 12°·1.

Plants injured, 1880-81—52 (1), 97 (2), 53 (3), total at 4 places.

ISLE-OF-WIGHT. *Rainfall*, above the av. (Newport). *Min. rainfall*, Osborne, alt., 172 ft. ; ht., 8 ins. ; 29·45 ins., on 141 days : max., Newport, alt., 57 ft. ; ht., 12 ft. 9 ins. ; 37·57 ins., on 145 days. *Min. temps.*, Ryde, alt., 100 ft. ; Jan. 21st, 10° : Osborne, alt., 172 ft. ; Jan. 22nd, 13°·8 : Ventnor, alt., 80 ft., Jan. 22nd, 14°·9. Temp. was below 32°, 19, and below 20°, 3 times.

Plants injured, 1880-81—5 (11), 9 (2), 9 (3), total at 1 place.

KENT. Year remarkable for extreme dryness of first half (Selling, Ramsgate). *Rainfall*, heavy in latter half (Tenderden, Ramsgate,

&c.). Destructive snow-storm, Oct. 20th (Beckenham). *Min. rainfall*, Chatham, alt., 136 ft.; ht., 1 ft.; 25·51 ins., on 143 days : max., Hythe, alt., 12 ft.; ht., 6 ins.; 46·21 ins., on 191 days : Green-wich Obs., alt., 155 ft.; 29·68 ins.; mean. of 30 yrs., being 25·17 ins. *Min. temps.* (W. Kent), Bromley, Jan. 22nd, 5° : Eltham, alt., 80 ft.; 17th, 5°·8 : Blackheath, 21st, 9°·2 : (Mid. and S. Kent) Chatham, alt., 135 ft.; 26th, 14·3 : Maidstone, alt., 80 ft.; 21st, 1° : Tunbridge, alt., 99 ft.; 22nd, 0°·5 : Tunbridge Wells, alt., 500 ft.; 22nd, 7°·2 : Cranbrook, alt., 224 ft.; 22nd, 4° : Tenderden, alt., 194 ft.; 22nd, 10° : (E. Kent) Ramsgate, alt., 105 ft.; 15th, 15° : Walmer 18th, 5° : Dover, alt., 30 ft.; 22nd and 23rd, 18°.

Plants injured, 1880-81—27 (1), 84 (2), 94 (3), total at 6 places.

SURREY. Very cold and dry to June; July, wet and cold. Heavy snowfall, Oct., favourable weather afterwards. Jan. 1881, one of the most severe months on record, temp., 0° on two occasions; great storm on 18th (Abinger Hall). *Min. rainfall*, Vauxhall (Effra Creek), alt., 35 ft.; ht., 30 ft. 9 ins.; 25·95 ins., on 149 days : max., Haslemere (Weycombe), alt., 583 ft.; ht., 4 ft.; 39·85 ins. *Min. temps.*, Brockham, alt., 200 ft.; Jan. 25th, -1° : Abinger Hall, 0° : Hersham, alt., 55 ft.; Jan. 25th, 2° : Beddington, alt., 90 ft.; Jan. 22nd, 7°·2 : Norwood, alt., 184 ft.; Dec. 22nd, 27°·7 ; Jan. 17th, 10°·8 : S. Norwood, alt., 190 ft.; Jan. 17th, 11°·1 : Croydon, alt., 201 ft.; Dec. 22nd, 27°·7 ; Jan. 21st, 11°·6.

Plants injured, 1880-81—71 (1), 117 (2), 88 (3), total at 6 places.

SUSSEX. Great dryness in early part of year : latter half very wet (Worthing, Maresfield, &c.). *Rainfall*, above av.; splendid harvest weather and finest crop of Potatoes for many years (W. Brighton). *Min. rainfall*, Beachy Head, alt., 515 ft.; ht., 1 ft.; 25·47 ins. : max., Petworth, alt., 190 ft.; ht., 1 ft. 4 ins.; 46·38 ins., on 118 days. *Min. temps.*, Hayward's Heath, alt., 250 ft.; Jan. 22nd, 23rd, 8° : Crowborough Beacon, alt., 776 ft.; Jan. 22nd, 9° : Littlehampton, Jan. 22nd, 10° : Brighton, alt., 206 ft.; Jan. 22nd, 11°·4 : Worthing, alt., 21 ft.; Jan. 22nd, 13°·5 : Eastbourne, alt., 24 ft.; Jan. 22nd, 15°·1 : St. Leonards, alt., 116 ft.; Jan. 22nd, 16°·7.

Plants injured, 1880-81—53 (1), 88 (2), 61 (3), total at 6 places.

REPORTS.

1. BERKS—NEWBURY, Enborne Lodge.—R. H. Valpy, Esq.

Gen. Char. of Soil—Gravelly, sandy loam or “drift.”

Alt. and Exposure—400 ft., S.W.

Rainfall, 1880—[Newbury (Greenham), dist., 3 ms., E.; alt., 260 ft.; ht., 1 ft.; 31·58 ins., on 190 days].

Min. Temps. and Dates—[Purley, dist., 16 ms., N.E.; Jan. 17th, 0°: Easthampstead, dist., 24 ms., E.; Jan. 17th, 4°].

Plants injured, 1880-81—6 (1), 8 (2), 2 (3)—Broccoli, 2. Brussels sprouts, 3. Cauliflower, 1. Celery, 2. Cherries, 2. Escallopia rubra, 2. Figs, 3. Laurel, Bay, 1. Laurustinus, 2. Lettuce, 2. Myrtle, 1. Rosemary, 2. Roses, dwfs., 1; nearly all newly budded Stands., 1. Taxodium distichum, young plants, 2. Walnut, 1.

Observations—*Fruit*, in 1881—Apples, bloom abundant, crop small; Apricots, a failure; Figs, black Ischian and brown Turkey, apparently kd.; Nectarines and Peaches stood fairly; Pears, bloom abundant, but crop small; Plums, every kind, a total failure; Strawberries, nearly all the newly budded, lost, and total failure with forcing plants, *e.g.*, Keen’s Seedling and President; Walnuts, almost a total failure.

2. WOKINGHAM, Easthampstead Pk.—Mr. N. Sinclair.

Gen. Char. of Soil—A stiff clay on low ground, but a sandy light soil on upper.

Alt. and Exposure—255 ft.; rather exposed in parts, and subject to spring frosts.

Rainfall, 1880—[Reading, dist., 8 ms., N.W.; alt., 157 ft.; ht., 3 ft.; 30·27 ins., on 121 days].

Date of Onset and Duration of Frost—Oct. 20th, great snowfall, with destruction to Oaks. Hard frost, Dec. 25th. Jan. 17th, 4°; on several morns., temp. was 8°. The severity of the season has not been equalled here for 36 years.

Plants injured, 1880-81—11 (1), 30 (2), 2 (3)—Aloysia citriodora, 1. Arbutus Andrachne, 2; A. procera, 2; A. Unedo, 2. Artichoke, globe, 2. Arundo conspicua, all, 1. Asparagus, 2. Aucuba japonica, 2. Berberis Darwinii, 2. Borecole, 2. Broccoli, all, 1. Brussels sprouts, 2. Cabbages, 2. Cedrus atlantica, 2. Celery, 2.

Cryptomeria elegans, 2. Daphne collina, 2. Echeveria metallica, 2. Erica, old plants, 1. Eucalyptus globulus, 1. Garrya elliptica, 3. Gooseberries, 2. Laurel, Bay, 1. Laurel, common, 2. Lavander, 2. Lonicera fragrantissima, 2. Magnolia grandiflora, 3. Myrtle, 1. Onions, winter, 2. Peaches, 2. Penstemons, 1. Picea grandis, 1. Pinus insignis, 2. Rhododendrons, 2. Roses, dwfs., 2. H. P.'s, 2; Stands., 2; Tea, 1. Strawberries, 2. Veronica Andersoni, 1. Wall-flowers, 2. Yew, 2. Yucca aloifolia, 2.

1. HANTS—ALTON, Basing Pk.—Mr. W. Smythe.

Gen. Char. of Soil—A stiff red clay, very strong; subsoil of chalk.

Alt. and Exposure—About 500 ft.; hill much exposed to wind.

Rainfall, 1880—[E. Worldham, dist., 2 ms.; alt., 499 ft.; ht., 1 ft. 6 ins.; 34·56 ins.].

Date of Onset and Duration of Frost—Jan., 1881, 13th to 26th: mean temp., 12°. No frost from 20th to 31st: N.E. winds prevailing.

Min. Temp. and Date—Jan. 16th, 3°.

Plants injured, 1880-81—25 (1), 38 (2), 31 (3)—Aloysia citrodora, 3. Ampelopsis Veitchii, 2. Apples, many old trees, all, 2. Apricots, 2. Arundo conspicua, 3. Asparagus, 2. Aucuba japonica, 1. Azalea amæna, 3; A. indica, 3. Bambusa Fortunei, 2. Borecole, 3. Box, edging, 2. Broccoli, all kinds, 1. Brussels sprouts, 2. Buxus balearica, 3. Cabbages, 2. Camellia, 1. Cauliflower, 1. Ceanothus americanus, 2; C. azureus, 2; C. dentatus, 2; C. grandiflorus, 2. Cedrus atlantica, 3; C. Deodara, many large trees, 1, 2; young plants, 1; C. Libani, 2. Celery, 2. Clematis Jackmanni, 2. Clianthus puniceus, 2. Coronilla glauca, 2. Cryptomeria elegans, 3; C. japonica, 3. Cupressus sempervirens, 3. Dahlia variabilis, 1. Dracæna australis, 1. Echeveria metallica, 1. Endive, 3. Erica carnea, 2. Escallonia macrantha, 2. Euonymus japonicus, 1; E. radicans, 1. Fuchsia coccinea, 1; F. Riccartoni, 2. Furze, 1; do., fl. pl., 1. Garrya elliptica, 3. Gladiolus, 1. Holly, 2; do., variegated, 2. Hydrangea arborescens, 1; H. Hortensea, 1; H. japonica, 1; H. Otaksa, 1. Hypericum balearicum, 3; H. calycinum, 2. Ivy, 2; do., variegated, 1. Jasminum nudiflorum, 3; J. officinale, 2. Juniperus, 1. Kale, 1. Laurel, Bay, 2. Laurel, common, 2; L. Portugal, 3. Lettuce, 3. Lonicera japonica, 2. Magnolia grandi-

flora, 2; do. Exmouth var., 2. Myrtles, 1. Nectarines, 1, 2. Onions, winter, 3. Pampas grass, 2. Passiflora cœrulea, 2. Parsley, 3. Peaches, 1, 2. Pears, 1, 2. Penstemons, 3. Phillyrea angustifolia, 3. Picea grandis, 3; P. Pinsapo, 3. Pinus insignis, 1. Plums, 2. Rhododendrons, Smithii and all early kinds, 1. Rosemary, 1. Roses, dwfs. on Manetti stocks, 3; H. P.'s, 2; Stands. on Briars, 2; Teas, on Manetti and Briars, 1; other kinds on own roots killed to the ground, 2. Sequoia sempervirens, 3. Skimmia japonica, 3. Tritoma uvaria, 2. Veronica Andersoni, 1; V. salicifolia, 1. Vines, all kinds, 2. Wallflowers, 2. Wistaria sinensis, 2. Yew, 3. Yucca aloifolia, 3; Y. filamentosa, 3; Y. gloriosa, 3.

Observations—Roses—Two Maréchal Niel and a Céline Forestière on a S. wall, with roots mulched with long dung, were uninjured; but a Triomphe de Rennes was killed under similar treatment.

2. ALTON, Blackmoor House.—Mr. R. Lock.

Gen. Char. of Soil—Light and sandy.

Alt. and Exposure—Exposed to N.W. winds.

Rainfall, 1880—34·28 ins.

Date of Onset and Duration of Frost—Oct. 21st, 27° : from Jan. 4th to 26th, very severe.

Min. Temp. and Date—Jan. 17th, 6°.

Plants injured, 1880-81—9 (1), 19 (2), 12 (3)—Ampelopsis Veitchii, 3. Arbutus Andrachne, 1. Broccoli, 2. Cabbages, 2. Carnations, 2. Cauliflower, 1. Celery, 2. Clematis Jackmanni, 1. Cryptomeria elegans, 3; C. japonica, 3. Endive, 2. Escallonia Ingrami, 2; E. rubra, 2. Euonymus japonicus, 1. Fuchsia coccinea, 3. Hydrangea Hortensea, 2. Jasminum officinale, 3. Kale, sea, 3. Kalmia latifolia, 3. Laurel, Bay, 2. Laurel, common, 3. Laurustinus, 2. Lavander, 1. Lettuce, winter, 2. Ligustrum lucidum, 3. Magnolia grandiflora, 1. Onions, winter, 2. Passiflora cœrulea, 1. Parsley, 2. Picea Pinsapo, 3. Pinus insignis, 2. Rosemary, 1. Roses, dwarfs, 2; H. P., 2; Tea, 1. Sequoia gigantea, 3. Strawberries, President and Eclipse, 3. Veronica salicifolia, 1. Wallflowers, 2. Weigela rosea, 2. Yucca aloifolia, 3.

3. BOURNEMOUTH.—Mr. J. J. Swaffield.

Gen. Char. of Soil—Sandy peat, mostly on gravel.

Alt. and Exposure—From sea-level to 100 ft.

Rainfall, 1880—[Christchurch, dist., 3 ms.; alt., 90 ft.; 30·14 ins., on 161 days].

Date of Onset and Duration of Frost—Jan. 6th, 32°; 7th, 26°; Jan. 13th, 22°; 20th and 22nd, 15°. Mean temp. at 7 a.m., from Jan. 7th to 22nd, 23°. [Below 32°, 23, and below 20° 10 times]. Ten ins. of snow fell on 18th and 19th; 12 ins. on 20th.

Min. Temps. and Dates—Jan. 20th, 22nd, 15°.

Plants injured, 1880-81—9 (2), 23 (3)—*Aloysia citriodora*, 3. *Aralia Sieboldii*, 3; *A. spinosa*, some, 2. *Arbutus Unedo*, 3. *Artichoke*, globe, 2. *Broccoli*, where quite exposed, all sorts, 2. *Buddleia globosa*, 3. *Camellias*, lost flower-buds in some plants only, 3. *Ceanothus dentatus*, against wall, 3; as shrubs, 2; *C. grandiflorus*, 3. *Desfontainea spinosa*, very young, 3. *Dracaena australis*, 3. *Euonymus japonicus*, 2. *Fuchsia Riccartoni*, 2; 13 years, never before cut, many 10 to 12 ft., most all cut to ground, but have broken strong. *Griselinia littoralis*, 3. *Hydrangea japonica*, 3. *Jasminum officinale*, 3. *Laurel*, Bay, 3. *Laurel*, common, 3. *Laurustinus*, 3. *Leycesteria formosa*, 3. *Ligustrum japonicum*, 3. *Myrtles*, many fine plants, 10 ft. high, 3. *Paulownia imperialis*, 3. *Phormium tenax*, 3. *Pinus insignis*, 3. *Pittosporum Tobira*, 3. *Quercus Suber*, 3. *Veronica Andersoni*, 2; *V. salicifolia*, 2; *V. Traversi*, 2.

Plants uninjured, 1880-81—*Abies Douglasii*, Almond, *Aloysia citriodora*, *Ampelopsis hederacea*, *A. Veitchii*, Apples, Apricots, *Araucaria imbricata*, *Arbutus Unedo*, *Aristolochia Siphon*, *Arundo Donax*, *Asparagus*, *Aucuba japonica*, *Do. variegata*, *Azalea amæna*, *A. indica*, *Bambusa Fortunei*, *Berberidopsis corallina*, *B. Darwinii*, *B. japonica*, *B. vulgaris*, *Biota orientalis*, *Borecole*, *Box*, *Carnations*, *Catalpa syringæfolia*, *Cedrus atlantica*, *C. Deodara*, *Celery*, *Cephalotaxus Fortunei*, *Chamærops Fortunei*, *Cherries*, *Chimonanthus fragrans*, *Cistus ladaniferus*, *Clematis Jackmanni*, *C. montana*, *Coronilla glauca*, *Cotoneaster microphylla*, *C. Simonsii*, *Cratægus Pyracantha*, *Cryptomeria elegans*, *C. japonica*, *Cupressus Lawsoniana*, *C. macrocarpa*, *C. sempervirens*, *Currants*, *Cytisus Laburnum*, *Daphne Mezereum*, *Deutzia scabra*, *Elæagnus argentea*, *Escallonia macrantha*, many plants, *E. montevidensis* housed, as it was nearly killed in 1879-80, *E. rubra*, *Eugenia Ugni*, *Euonymus europæus*, *E. radicans*, *Forsythia viridissima*, *Fuchsia carolina*, *F. gracilis*, *Gladioli*, *Gooseberries*, *Holly*, *Do. variegated*, *Hyacinths*, *Iris*, *Ivy*, *Do. variegated*, *Jasminum nudiflorum*, *Kale*, *Kalmia latifolia*, *Portugal Laurel*, *Lavander*, *Lettuce*, *Ligustrum vulgare*, *Lilac*, *Lilium auratum*, *L. lancifolium*, *Liquidambar styraciflua*, *Magnolia grandiflora*, *Do. Ex-*

mouth, var., Medlar, Mulberry, Narcissus, Nectarines, Osmanthus ilicifolius, Pampas grass, Passiflora cœrulea, Parsley, Pears, Phillyrea angustifolia, Picea amabilis, P. cephalonica, P. grandis, P. lasiocarpa, P. Lowiana, P. Nordmanniana, P. Pinsapo, Pinus excelsa, P. Laricio, P. pinea, P. sylvestris, Platanus orientalis, Plums, Pyrus japonica, Quercus Ilex, Quince, Retinospora plumosa, R. squarrosa, R. ericoides, R. pisifera, Rhododendrons, Rhus glabra, Ribes, Rosemary, Salisburia, Sequoia gigantea, Skimmia japonica, Stocks, Strawberries, Taxodium distichum, Taxus baccata (Yew), Do. fastigiata, Tritoma uvaria, Ulex europæa (Furze), Do. fl. pl., Vines, Black Hamburg and sweet water, Wallflowers, Weigela rosea, Wistaria sinensis, Yucca filamentosa, Y. gloriosa.

4. FARNBOROUGH, The Grange.—W. Sherwin, Esq.

Gen. Char. of Soil—Light sand and gravel.

Alt. and Exposure—Open and somewhat low.

Rainfall, 1880—32·5 ins.

Date of Onset and Duration of Frost—Oct. 20th, snow-storm.

Min. Temp. and Date—Jan. 26th, 22°.

Plants injured, 1880-81—9 (1), 18 (2), 10 (3)—Abies Douglassii, 2. Arbutus Andrachne, 3; A. Unedo, 1. Aucuba japonica, 3. A. j. variegata, 3. Azalea amæna, 3. Berberis Darwinii, 2. Broccoli, 3. Brussels sprouts, 2. Buddleia globosa, 2. Buxus balearica, 2. Catalpa syringæfolia, aurea, 3. Cauliflowers, 1. Cercis siliquastrum, 1. Cupressus Lawsoniana, lutea and glauca, 1. Desfontainea spinosa, 2. Echeveria metallica, 1. Escallonia macrantha, 2; E. rubra, 2. Euonymus europæus, 1. Furze, fl. pl., 1. Garrya elliptica, 2. Hibiscus syriacus, 2. Holly 3. Laurel, Bay, 2. Laurel, common, 2; L. Portugal, 2. Laurustinus, fine plants, 1. Ligustrum lucidum, 1. Magnolia grandiflora, Exmouth vars., 2. Oak "Lucombe," 1. Olearia Haastii, 1. Paulownia imperialis, 3. Penstemons, 2. Pinus insignis, 3. Quercus Ilex, 2. Rhododendrons, John Spencer, Mrs. Heneage and Victoria, 2. Roses, H.P.'s and Standards, many, 1. Sequoia gigantea, 3. Thuja gigantea, 2. Tritoma uvaria, 3. Wallflowers, 2.

1. ISLE-OF-WIGHT—RYDE, Appley Towers.—Mr. W. Stanbury.*

Gen. Char. of Soil—Loam, mostly resting on a clay subsoil.

* See an account in *Gard. Chron.*, 1881, Oct. 15th, p. 494.

Alt. and Exposure—100 to 200 ft. ; exposed to N.W., N., and N.E.

Rainfall, 1880—[Ryde, alt., 17 ft. ; 33·49 ins., on 120 days. Above the av. (Newport)].

Min. Temps. and Dates—Jan. 21st, 10° [Osborne, dist., 4 ms., W. ; alt., 172 ft. ; Jan. 22nd, 13°·8 : Ventnor, dist., 11 ms. S. ; alt., 80 ft. ; 22nd, 14°·9].

Plants injured, 1880-81—5 (1), 9 (2), 9 (3)—*Acacia dealbata*, 15 ft. high, 2. *Benthamia fragifera*, 3. Carnations, dark more than light ones, 3. *Catalpa syringæfolia*, aurea, 2. *Citrus Aurantium*, 1. *Clianthus puniceus*, 1. *Dracæna australis*, 2. *Elæagnus argentea*, 3. *Embothrium coccineum*, 1. *Escallonia montevidensis*, 2. *Eucalyptus globulus*, 40 ft., 1 ; *E. Gunnii* (?), 3. *Habrothamnus*, 1. *Lapageria* on walls, 2. Laurel, Bay, 3. Laurel, Portugal, 3. *Leptospermum lanigerum*, 3. *Melianthus major*, 2. Myrtle, 3. *Olea europea*, 2. *Phormium tenax*, 2. *Pittosporum Tobira*, 3. *Rhododendron Nuttalli*, 3. *Veronica Andersoni*, 2.

Plants uninjured, 1880-81—*Abelia floribunda*, *A. rupestris*, *Abies Kämpferi*, *Acacia Nemu*, *Agapanthus* (slightly mulched), *Akebia quinata*, *Aralia Sieboldii*, *Arbutus procera*, *Azalea amæna*, *A. indica*, *A. mollis*, *Azara microphylla*, *A. dentata*, *Berberidopsis corallina*, *Calceolaria violacea*, *Camellias*, *Ceanothus azureus*, *Chamærops Fortunei*, *Choisya ternata*, *Colletia ferox*, *Desfontainea spinosa*, *Desmodium penduliflorum*, *Dimorphanthus mandschuriensis*, *Edwardsia grandiflora*, *Escallonia macrantha*, *Eugenia apiculata*, *E. Ugni*, *Fremontia californica*, *Grevillea rosmarinifolia*, *Gunnera scabra*, *Laurus camphora*, *Leycesteria formosa*, *Olearia Haastii*, *Parrotia persica*, *Philesia buxifolia*, *Pinus insignis*, 60 ft., *Rhododendrons Sikkim*, *Staphylea colchica*, *Stauntonia latifolia*, *Trachelospermum jasminoides*, *Veronica Traversi*, *Xanthoceras sorbifolia*.

1. KENT—BROMLEY.—Rev. A. Rawson.

Gen. Char. of Soil—Gravel in parts, and clay in parts.

Alt. and Exposure—200 ft. ; chiefly sheltered.

Rainfall, 1880—32·21 ins. ; or 2·41 above av. of 15 yrs.

Min. Temps. and Dates—Jan. 22nd, 5° ; mean of Jan. 1881, 9°·36 below av. of 15 yrs. : [Beckenham, dist., 2 ms., W. ; alt., 142 ft. ; Jan. 21st, 6°·7 : Eltham, dist., 4 ms., N. ; Jan. 17th, 5°·8 : Blackheath, dist., 5 ms., N. ; Jan. 21st, 9°·2 : Greenwich, dist., 5 ms., N.W. ; alt., 155 ft. ; Jan. 17th, 12°·7].

Plants injured, 1880-81—8 (1), 18 (2), 33 (3)—*Abies Morinda*, 3. *Acacia monophylla*, 3. *Acer palmatifidum*, 3. *Aloysia citriodora*, 2. *Ampelopsis Veitchii*, 3. *Araucaria imbricata*, 3. *Arbutus Unedo*, 2. *Aucuba japonica*, 3. *Bambusa Fortunei*, 3. *Berberidopsis corollina*, 1. *Berberis aristata*, 3. Broccoli, all except half a dozen plants of Cattell's Eclipse, 1. *Buddleia globosa*, 1. *Buxus balearica*, 2. *Catalpa syringæfolia*, 2; *C. s. aurea*, 2. *Cedrus Deodara*, 3. *Cercis siliquastrum*, 3. *Deutzia scabra*, 3. *Eulalia japonica variegata*, 3. *Euonymus europæus*, 3. *Forsythia viridissima*, 3. Furze, 2; Do., fl. pl., 2. *Garrya elliptica*, 3. *Griselinia littoralis*, 1. *Hedera Rœgneriana*, 3. *Hypericum Calycinum*, 3. Iris, only Kämpferi of the hardier sorts, 2. *Juniperus chinensis*, 3. Laurel, Bay, 1. Laurel, common, 2; L. Portugal, 3. *Laurustinus*, 2. Lavander, 2. *Lilium lancifolium*, 2. *Lonicera japonica*, 3. *Maclura aurantiaca*, 3. *Magnolia grandiflora*, 3. Onions, winter, 3. *Opuntia Rafinesquiana*, 3. Pampas grass, 3. *Paulownia imperialis*, 2. Penstemons, 1. *Phillyrea augustifolia*, 2. *Photinia serrulata*, 2. *Populus angulata*, 1. *Quercus Ilex*, 3. *Rhus glabra laciniata*, 3. Roses, Teas on Briar and Manetti, 2. *Ruscus aculeatus*, 3. *Saxifraga purpurascens*, 2. *Senecio pulcher*, 3. *Sequoia gigantea*, facing wind, 3. *Spiræa Lindleyana*, 2. Stocks, 1. *Thujopsis borealis*, 3. Wallflowers, 3. *Weigela rosea*, 3.

Plants uninjured, 1880-81—*Abies Douglasii*, *Ampelopsis hederacea*, Apples, Apricots on walls, globe Artichoke mulched, Asparagus, *Berberis ilicifolia*, *Bomarea acutifolia*, Brussels sprouts, Box, Cabbages, Carnations, *Castanea vesca*, *Cedrus atlantica*, Cherries, *Chimonanthus fragrans*, *Cotoneaster microphylla*, *C. Simonsii*, *Cratægus oxyacantha*, fl. pl., *C. Pyracantha*, *Cupressus Lawsoniana*, Currants, *Cytisus Laburnum*, *Exochorda grandiflora*, *Fuchsia gracilis*, Gooseberries, *Halesia tetraptera*, Holly, Do. variegated, Ivy, Larch, *Ligustrum vulgare*, Lilac, *Liquidambar styraciflua*, *Lonicera fragrantissima*, *L. Periclymenum*, *Magnolia acuminata*, Medlar, Narcissus, *Negundo fraxinifolia*, *Osmanthus ilicifolius*, Parsley, *Picea Nordmanniana*, *Pinus excelsa*, *P. sylvestris*, *Platanus orientalis*, Plums, *Pyrus japonica*, *Quercus robur*, Quince, Rhododendrons, Ribes, Roses, seedling briar, H. P., *Salisburia*, *Skimmia japonica*, *Tritoma uvaria*, *Ulmus*, *Viburnum plicatum*, *Wistaria sinensis*, Yew.

2. DEAL—WALMER CASTLE—Mr. J. Swinnard.

Gen. Char. of Soil—A nice loam with a subsoil of stiff clay.

Alt. and Exposure—Slightly above sea-level and almost within reach of the spray.

Rainfall, 1880—[Deal (Northbourne), alt., 60 ft.; 40·98 ins., on 162 days].

Min. Temps. and Dates—Jan. 16th, 16°; 18th, 5°; 22nd, 10°; 24th, 22°; 26th, 18°; Feb. 7th, 25°; 12th, 26°: [Dover, dist., 6 ms., S.; alt., 30 ft.; Jan. 22nd, 23rd, 18°].

Plants injured, 1880-81—7 (1), 27 (2), 21 (3)—*Arbutus Andrachne*, 2. *Artichoke*, globe, 3. *Aucuba japonica*, 2. *Berberis Darwinii*, 2. *Broccoli*, Cattell's Eclipse, Cooling's Matchless, Deal White, Early Penzance, Late White, Miller's Dwarf, and Sutton's New Late Queen, all, 1. *Buddleia Lindleyana*, 3. *Carnations*, 2. *Cedrus atlantica*, 2; *C. Deodara*, 2. *Cotoneaster Simmonsii*, 2. *Cupressus Lawsoniana*, 2; *C. macrocarpa*, 3. *Eucalyptus globulus*, 1. *Euonymus europæus*, 2. *Forsythia elegans*, 3; *F. viridissima*, 3. *Furze*, 2. *Garrya elliptica*, 2. *Holly*, 2. *Ivy*, 3. *Jasminum nudiflorum*, 2. *Juniperus*, 3. *Larch*, 3. *Laurel*, Bay, 2. *Laurel*, common, 2; *L. Portugal*, 3. *Lavander*, 3. *Ligustrum lucidum*, 3. *Lilac*, 3. *Lilium auratum*, 1; *L. lancifolium*, 1. *Lonicera japonica*, 2. *Magnolia grandiflora*, 2. *Myrtle*, 2. *Penstemons*, 1. *Phillyrea angustifolia*, 2. *Pinus excelsa*, 3; *P. insignis*, 1; *P. Laricio*, 2; *P. sylvestris*, 2. *Platanus orientalis*, 2. *Retinospora*, 3. *Ribes*, 3. *Rosemary*, 2. *Roses*, dwf., 2; *Stand.*, 2; *Tea*, 3. *Seafortia elegans*, 3. *Sequoia gigantea*, 2. *Stocks*, 3. *Tritoma uvaria*, 3. *Veronica Andersoni*, 1. *Wallflowers*, 3. *Weigela rosea*, 3. *Yew*, 2. 3. SANDWICH, Betteshanger.—Mr. G. Laurence.

Gen. Char. of Soil—Chalky.

Alt. and Exposure—Exposed to sea-breeze on E., being dist., 4 ms. from sea.

Rainfall, 1880—40·98 ins.

Min. Temps. and Dates—[Walmer, dist., 4 ms.; Jan. 18th, 5°: rainfall, dist., 9 ms., N; alt., 105 ft.; Dec. 26th, 29°·9; Jan. 15th, 15°].

Plants injured, 1880-81—9 (1), 21 (2), 36 (3)—*Aloysia citriodora*, 1. *Aralia Sieboldii*, 3. *Arbutus Unedo*, 2. *Artichoke*, globe, 3. *Broccoli*, Cattell's Eclipse, Leámington, Snow's Superb White, Sutton's Perfection, 1. *Brussels sprouts*, 3. *Buddleia globosa*, 2. *Buxus balearica*, 3; *B. sempervirens* (Box), 3. *Cabbages*, 3. *Carnations*, 3. *Cauliflower*, Veitch's Autumn Giant and Early Dwarf, 1.

Ceanothus dentatus, 2. *Cedrus Deodara*, 3; *Libani*, 3. *Celery*, 3. *Cistus ladaniferus*, 2. *Coronilla glauca*, 2. *Cryptomeria elegans*, 3. *Elæagnus argentea*, 3, *Endive*, 1. *Eriobotrya japonica*, 3. *Escalonia Ingrami*, 3; *E. macrantha*, 2. *Eucalyptus globulus*, 1. *Euonymus europæus*, 2; *E. japonicus*, 2; *E. radicans*, 2. *Furze*, 3; fl. pl., 3. *Garrya elliptica*, 3. *Gladiolus*, 1. *Hibiscus syriacus*, 3. *Hypericum Calycinum*, 3. *Holly*, 3; *Do.*, varieg., 3. *Ivy*, varieg., 3. *Juniperus*, 3. *Larch*, 3. *Laurel*, Bay, 3. *Laurel*, Portugal, 3. *Laurustinus*, 2. *Lavander*, 2. *Lettuce*, Moor Park, 2. *Leycesteria formosa*, 3. *Magnolia grandiflora*, 2. *Myrtles*, 2. *Pampas grass*, 3. *Passiflora cœrulea*, 1. *Penstemons*, 2. *Phillyrea angustifolia*, 3. *Picea Pinsapo*, 3. *Quercus Ilex*, 2; *Q. Suber*, 2. *Quince*, 3. *Raphiolepis ovata*, 2. *Rosemary*, 3. *Roses*, Dwarfs, 3; *H. P.'s*, 3; *Stands.*, 3; *Tea*, 1; *Stocks*, 2. *Strawberries*, 3. *Tritoma uvaria*, 2. *Veronica Andersoni*, 1. *Wallflowers*, 2. *Yew*, 3. *Yucca gloriosa*, 3.

4. TUNBRIDGE WELLS, Dunorlan.—Mr. D. Walker.

Gen. Char. of Soil—Lower ground, a strong loam on a very stiff clay. Higher ground, a sandy loam on a sandy rock.

Alt. and Exposure—80 to 160 ft.; S.E. slope.

Rainfall, 1880—30·18 ins. (Jan. and May omitted).

Date of Onset and Duration of Frost—Oct. 20th, 30°. Eight or more inches of snow fell: last frost May 17th.

Min. Temps. and Dates—Jan. 22nd, 6° [on same day, Tunbridge, dist., 4 ms., N.; alt., 99 ft.; 0°·5: T. Wells, alt., 500 ft.; 7°·2: Cranbrook, dist., 12 ms., E.; alt., 224 ft.; 4°; and Tenterden, dist., 18 ms., E.; alt., 194 ft.; 10°].

Plants injured, 1880-81—3 (1), 8 (2), 4 (3)—*Arbutus Unedo*, 1. *Camellias*, 3. *Cedrus Deodara*, 2. *Cupressus macrocarpa*, 2. *Escalonia macrantha*, 2. *Laurel*, Bay, 1, 2. *Laurel*, common, 2. *Picea grandis*, 2; *P. lasiocarpa*, 2; *P. Pinsapo*, 3. *Pinus insignis*, 1. *Roses*, 2. *Sequoia gigantea*, 3; *S. sempervirens*, 2.

Plants uninjured—*Abies Douglasii*, *Cryptomeria japonica*, *C. Lobbii*, *Cupressus Lawsoniana*, *Desfontainea spinosa*, *Libocedrus decurrens*, *Picea cephalonica*, *P. nobilis*, *P. Nordmanniana*, *Retinospora obtusa aurea*, *R. pisifera*, *Thuja aurea*, vars., *Thujopsis borealis*, *T. dolabrata*.

1. SURREY—GUILDFORD, E. Horsley Towers.—Earl of Lovelace.

Gen. Char. of Soil—Various; gravel and loam in the pleasure

ground, with a subsoil of chalk of depths from 7 to 20 feet.

Alt. and Exposure—300 ft., slightly sloping N. to Thames valley.

Rainfall, 1880—36·31 ins.

Min. Temps. and Dates—[Brockham, dist., 7 ms., E.; alt., 200 ft.; Jan. 25th, -1°: Abinger Hall, dist., 4½ ms., S., 0°].

Plants injured, 1880-81—8 (2)—*Arbutus Unedo*, 2. *Bupleurum fruticosum*, 2. *Buxus balearica*, 2. *Cedrus Deodara*, 2. *Garrya elliptica*, 2. Laurel, Bay, 2. Laurel, common, round-leaved var., 2. *Laurustinus*, 2.

Observations—The year 1880 was unfavourable for tree growth in spite of the wetness of the season. The progress of the Larch, of which there are extensive plantations on the hills here, and of the Coniferæ generally, are not equal to that of the two preceding seasons. The extraordinary rainfall of Sept. and Oct. (14 ins. which is almost unprecedented), and the mildness of the latter month till about the 25th left every thing growing and nothing ripened. Then came a heavy fall of snow, which did not melt for three days. The Oaks, Elms and Beeches being green and full of leaf were extensively mutilated and injured. The mischief is felt now in barking, as the trees we are cutting do not break readily, some not all. The injury done to Larch trees, 25 years old, by the hard frosts of six years ago is singular. Many in a deep valley of the chalk hills were cut out, being evidently dead, and others showed signs of life; but every year it seemed that the revival was but temporary, and now on a space of two acres in the bottom, every tree is decidedly dead, of the average height of 36 feet.

2. Kew, Royal Gardens.*—Mr. G. Nicholson.

Gen. Char. of Soil—[Light on gravel].

Alt. and Exposure—[A few feet above the Thames].

Rainfall, 1880—Kew Obs., alt., 19 ft.; ht., 1 ft. 9 ins.; 28·73 ins., on 163 days].

Min. Temps. and Dates—[Chiswick, dist., 2 ms., E.; Jan. 17th, 5°: Isleworth, dist., 2 ms., W.; Jan. 17th, 4°·6].

Plants injured, 1880-81—68 (1), 66 (2), 18 (3)—*Abelia rupestris*, on wall, 3; *A. triflora*, in open, 1; on wall, 3. *Akebia quinata*, in open, matted, 1. *Amicea Zygomeresis*, 2. *Aralia Sieboldii*, 1; *A. spinosa*, 2. *Arbutus Unedo*, vars., 1, 2. *Aristolochia altis-*

* From *Gardners' Chron.*, vol. xvi., 1881, pp. 167, 204.

sima, recovered, 2. *Aristotelia Macqui*, and varieg., in shrubbery, 1; *A. racemosa*, on wall, 2. *Atriplex Halimus*, 1. *Azara*, protected in open, 1; Do., on wall, 2. *Berberis angulosa*, 1; *B. asiatica*, 1; *B. concinna*, 2; *B. coriacea*, 1; *B. Darwinii*, 2; *B. fuchsioides*, 1. *B. glauca*, 1; *B. glaucescens*, 1; *B. ilicifolia*, 1; *B. Knightii*, 1; *B. Lycium*, 1; *B. virgata*, 1; *B. Wallichiana*, 1. *Bryanthus erectus*, 1. *Buddleia curvifolia*, 1; *B. globosa*, 1; *B. intermedia*, 1; *B. Lindleyana*, 1. *Ceratonia Siliqua*, under matting, 1. *Cistus Bertholletianus*, 1; *C. ladaniferus*, in open, 2; *C. latifolius*, 1. *Clianthus puniceus*, on wall, 2. *Cneorum tricoccum*, 1. *Colletia* sp., 2, 3. *Convolvulus Cneorum*, under matting, 1. *Coprosma Baueriana*, on wall, 2. *Coriaria myrtifolia*, 1. *Cratægus crenulata*, 2; *C. Pyracantha*, 3. *Daphne Cneorum*; *D. Mazellii*; *D. Van Houttei*, all, in open, 1; by wall, 2. *Desmodium*, on walls, kd. to grd., 2. *Discaria longispina*, on wall, 2. *Edwardsia microphylla*, 2. *Elsholtzia*, on walls, kd. to grd., 2. *Embothrium coccineum*, on wall, 2. *Erica codonodes*, 1; *E. mediterranea*, 2; *E. multiflora*, 1; *E. scoparia*, 1. *Ercilla spicata*, protected, 2; in open, separately and carefully matted, 1, or kd. to grd., 2; on walls, not matted, 2. *Eucalyptus Gunnii*, old tree, 3. *Euonymus glaber*, 2; *E. japonicus*, vars., 2; *E. pungens* and vars., 2. *Fabiana imbricata*, 2. *Fontainesia phillyræoides*, in open, 1; on walls, 3. *Garrya* sp., 2. *Gaultheria nummularia*, 1. *Genista monosperma*, 2. *Grabowskia boerhaavifolia*, 1. *Habrothamnus*, on wall, kd. to grd., 2. *Hedera algeriensis*, 2; *H. himalaica*, 2; *H. maculata*, 3; *H. minor*, 3; *H. rhombea*, 3. *Helianthemum halimifolium*, 1; *H. Rhodax*, 1. *Holboellia latifolia*, and others, on wall, kd. to grd., 1 or 2. *Ilex Azevinho*, 2; *I. Cassine*, 2; *I. cornuta*, 2; *I. dipyrena*, 3. *Illicium anisatum*, 1; *I. floridum*, 1; *I. religiosum*, 1. *Jasminum*, all in open, 1, 2; on walls, 3. *Lardizabala biternata*, in open, matted, 1. *Laurel*, Bay, 2. *Laurel*, common, vars. *intermedia* and *Jeffreyi*, 2; *L. Portugal*, vars. *aureo-picta* and *azorica*, 1. *Laurustinus*, 2. *Ligustrum coriaceum*, 1, 2; *L. japonicum*, 1, 2; *L. lucidum*, 1, 2; *L. ovalifolium*, 3; *L. sinense*, 3. *Liquidambar chinensis*, against wall, kd. to grd., 2. *Magnolia grandiflora*, vars., in a dell, 2, 3; *M. gracilis*, 1. *Mahonia angulosa*, 2; *M. pallida*, 1. *Menziesia globularis*, 2. *Muehlenbeckia adpressa*, on wall, 2. *Myrtle*, 2. *Nandina domestica*, in open, 1; on wall, 2. *Olearia myrsinoides*, 2. *Osmanthus Aquifolius*, matted, 2. *Pernettya pilosa*, 1. *Phillyrea angustifolia*, 2; *P. buxifolia*, 2; *P. media*,

1, 2. *Photinia serrulata*, 1. *Pittosporum tenuifolium*, 1; *P. Tobira*, 1. *Plagianthus betulinus*, on wall, 2. Pomegranate, vars., in open, 1; on wall, 2. *Pterocarya stenophylla*, 1. *Quercus crassifolia*, sheltered, 1; *Q. Gramuntia*, 3; *Q. Ilex*, vars. *agrifolia*, &c., 2, 3; *Rhamnus Clusii*, 1; *R. lanceolatus*, 1; *P. utilis*, 1. *Rhododendron lepidotum*, 2; *R. virgatum*, 3. *Ribes speciosa*, open, 1; on wall, 2. *Rosa Banksiæ*, 2; *R. bracteata*, 2; *R. Brunouiana*, 2, 3; *R. Macartney*, 1. *Solanum jasminoides*, kd. to grd., 2. *Styrax officinale*, 2. *Symplocos serrulata*, on wall, kd. to grd., 2. *Veronica Traversi*, 1. *Vitex agnus-castus*, in open, 1; on wall, 2. *Xanthoxylon Bungei*, 1.

Plants uninjured—*Akebia quinata*, slightly protected, on wall; *Aralia pentaphylla*, open and on wall; *Arbutus Andrachne*; *A. hybrida*; *Bignonia capreolata*; *Buxus balearica*; *Camphorosma monspeliaca*, on wall; *Cassinia fulvida*; *Cercidiphyllum japonicum*, well sheltered; *Colletia serratifolia*, in open; *Dacrydium Franklini*, on wall and in open; *Discaria Toumatou*; *Escallonia*s, matted, on walls; *Eucalyptus coccifera*, young plants by wall; *Enkyanthus nivalis*, agst. wall; *Garrya elliptica*; *Holboëllia hexaphylla*; *Idesia polycarpa*, on wall; *Ilex crenata* and vars., *I. opaca*; *Ligustrum vulgare*; *Marsdenia erecta*; *Magnolia conspicua*, *M. obovata*; *Olearia Haastii*; *Paliurus aculeatus*; *Phlomis fruticosa*, in open; *Phillyrea Vilmoriniana*; *Quercus aquifolia*, var. *ilicifolia*, *Q. coccifera*, *Q. glabrâ*, *Q. pseudo-coccifera*; *Rhododendron Him. sp.* (excepting *R. lepidotum* and *virgatum*); *Rosa macrocarpa*, *R. microphylla*, *R. rugosa*; *Schizandra hydrangeoides*; *Vaccinium maderense*; *Veronica carnosula*, and *V. pinguifolia*, protected by snow.

3. SUTTON, Mulgrave Road.—Mr. F. Hepburn.

Gen. Char. of Soil—A sandy loam, 2 to 3 ft. deep, on chalk.

Alt. and Exposure—About 220 ft. Sheltered on N. and E.; exposed to S. and W.

Rainfall, 1880—[Mulgrave Road, alt., 230 ft.; ht., 7 ft. 3 ins, 31·77 ins.].

Date of Onset and Duration of Frost—Oct. 30th, 26°; Nov., eleven nights below 32°; Dec., six nights below 32°; Jan., ten nights under 20°; 3rd to 28th was a continuous frost.

Min. Temp. and Date—Jan. 22nd, 9°.

Plants injured, 1880-81—1 (1), 4 (2), 11 (3)—*Ampelopsis Veitchii*, 3. *Arbutus Unedo*, 2. *Aucuba japonica*, 3. *Cabbages*, 2.

Catalpa syringæfolia (see below), 2. *Escallonia macrantha*, 3. *Euonymus japonicus*, 3. *Garrya elliptica*, 3. Laurel, common, 3. Do. round-leaved, 3; Do. *Colchica*, 3; Do. *Caucasica*, 3. Laurel, Bay, 2. *Laurustinus*, 3. Lettuce, Brown Cos, 1. Onions, winter, 3. Pampas grass, 3. *Paulownia imperialis*, blossom spikes killed, 3. Wall-flowers, 3.

Plants uninjured—Almond, *Ampelopsis hederacea*, Apples, Apricots, *Araucaria imbricata*, *Aristolochia Sipo*, Asparagus, Azalea indica, *Berberis Darwinii*, *B. vulgaris*, *Biota orientalis*, Borecole, Brussels sprouts, Box, *Castanea vesca*, *Cedrus Deodara*, Celery, Cherries, *Chimonanthus fragrans*, *Clematis Jackmanni*, *Coronilla glauca*, *Cotoneaster microphylla*, *Cratægus oxyacantha*, fl. pl., *C. Pyracantha*, *Cupressus Lawsoniana*, *C. sempervirens*, Currants, *Cytisus Laburnum*, *Daphne Laureola*, *D. Mezereum*, *Euonymus radicans*, Gooseberries, Holly, Hyacinths, *Hydrangea Hortensea*, Ivy, Do. variegated, *Jasminum officinale*, *Juniperus*, Kale, Portugal Laurel, Lavander, *Leycesteria formosa*, *Ligustrum vulgare*, Lilac, *Lonicera fragrantissima*, *Magnolia grandiflora*, Medlar, Narcissus, Nectarines, *Negundo fraxinifolia*, Parsley, Peaches, Pears, *Phillyrea angustifolia*, *Picea Nordmanniana*, *Pinus insignis*, Plums, *Pyrus japonica*, *Quercus robur*, *Q. Suber*, Rhododendrons, Ribes, *Salisburia*, *Sequoia gigantea*, *Spartium junceum*, Strawberries (Eleanor, President, Seedling Eliza, Sir Joseph Paxton, and Vicomtesse Héricart de Thury), *Tritoma uvaria*, Vines (Sweetwater), *Weigela rosea*, *Wistaria sinensis*, Yew, Do. fastigate, *Yucca aloifolia*.

Observations—The *Catalpa syringæfolia* is a small tree with a head of about 6 ft. diam. The buds just opening, April 21st, were killed by frost; but the dry winds seemed to gradually dry up the branches, and it died back to the main stem, excepting about 6 inches of one branch. This has broken on four sides, and now bears a tolerable head, made in three months (Sept. 6th). Walnut, leaf buds killed by frost, April 24th.

4. WEYBRIDGE, Heatherbank.—Mr. G. F. Wilson.

Altitude—[150 ft.].

Rainfall, 1880—[W. Heath (Bartropps), alt., 150 ft.; 29·52 ins.].

Min. Temps. and Dates—[Hersham, dist., 2 ms.; alt., 55 ft.; Jan. 25th, 2°].

Plants injured, 1880-81—The amount of injury has been very different, not only in our three gardens (two here and one at Wirley)

but in different situations in the same garden ; for example :—*Ligustrum japonicum*, cut last 3 winters, has parts now coming into bloom (July 25, 1881). *Photinia serrulata*, in exposed field, 3. *Raphiolepis ovata*, in several places, 1. *Tecoma radicans*, kd. to grd., is shooting up again (July 25th), 2. *Veronica Traversi*, in exposed places, 2.

Plants uninjured—*Abelia rupestris* in all situations, *Choisya ternata* thoroughly exposed on S. and W. walls (Wirley). *Garrya elliptica* on N. fence, *Gunnera scabra* (in Wirley Wood), *Hedychium coronarium*, *Omphalodes Lucilloea* (Wirley), *Periploca græca* on N. fence, *Raphiolepis ovata* on a sheltered rockwork, *Tritoma caulescens*, *Trochostigma volubilis*, *Veronica Traversi* on a cool rockwork, *Zenobia speciosa pulverulenta*.

5. WIMBLEDON, Atherton Grange.—J. D. Llewelyn, Esq.

Gen. Char. of Soil—Sand and gravel.

Rainfall, 1880—[Wimbledon, alt., 170 ft. ; ht., 3 ft. ; 31·26 ins., on 182 days].

Min. Temps. and Dates—[Norwood, dist., 6 ms., E. ; alt., 184 ft. ; Jan. 17th, 10°8 : S. Norwood, alt., 190 ft. ; Jan. 17th, 11°1].

Plants injured, 1880-81—5 (1), 3 (2), 5 (3)—*Arbutus Unedo*, 2. *Chamærops Fortunei*, 3. *Cistus formosus*, 3 ; *C. incanus*, 3 ; *C. purpureus*, 3. *Escallonia macrantha*, 2. *Eulalia japonica*, 2. *Iris Kæmpferi*, 3. *Laurustinus*, 1. *Magnolia grandiflora*, 1. *Myrtle*, 1. *Passiflora cœrulea*, 1. *Senecio pulcher*, 1.

Plants uninjured—Almond, *Araucaria imbricata*, *Arbutus Andrachne*, *A. procera*, *Aucuba japonica*, *Do. variegata*, *Berberis Darwinii*, *B. vulgaris*, *Biota orientalis*, Box, *Camellias*, *Cedrus Deodara*, *Cistus Algarvensis*, *C. crispus*, *C. ladaniferus*, *C. lusitanicus*, *Clematis Jackmanni*, *C. montana*, *Cryptomeria japonica*, *Cupressus Lawsoniana*, *Cypripedium acaule*, *Cytisus Laburnum*, *Desfontainea spinosa*, *Deutzia scabra*, *Eulalia japonica*, Furze, fl. pl., *Garrya elliptica*, *Hydrangea Hortensea*, *Iris cristata*, *I. Notha*, *I. nudiflora*, *I. reticulata*, *I. setosa*, *I. tenax*, *Jasminum nudiflorum*, *Kalmia latifolia*, Bay Laurel, common and Portugal Laurels, Lavander, Lilac, *Lilium auratum*, Parsley, *Phillyrea angustifolia*, *Pyrus japonica*, *Quercus Suber*, *Sequoia gigantea*, *Storæa purpurea*, *Tritoma uvaria*, Wall-flowers, *Wistaria sinensis*, Yew, Do. Irish, *Yucca gloriosa*.

6. WIMBLEDON, Oakfield.—G. C. Joad, Esq.

Gen. Char. of Soil.—Sandy gravel and clay.

Alt. and Exposure—About 150 ft.

Rainfall, 1880 — [Alt., 170 ft. ; ht., 3 ft. ; 31·26 ins., on 182 days].

Min. Temps. and Dates—[Norwood, dist., 5 ms., E. ; alt., 184 ft. ; Jan. 17th, 10°·8].

Plants injured, 1880-81—13 (1), 34 (2), 36 (3)—*Abelia rupestris*, 3, *Abies Morinda*, 3. *Andromeda arborea*, 3. *Aralia papyrifera*, 1 : *A. Sieboldii*, 1. *Arbutus procera*, 2 ; *A. Unedo*, 3. *Arun-do conspicua*, 2 ; *A. Donax*, 1. *Azara microphylla*, 2. *Benthamia fragifera*, 2. *Borya ligustrina*, 2. *Buddleia globosa*, 2 ; *B. Lindleyana*, 1. *Bupleurum fruticosum*, 3. *Cardiandra alternifolia*, 2. *Ceanothus azureus*, 3 ; *C. dentatus*, on wall, 3 ; *C. divaricatus*, on wall, 3 ; *C. ovatus*, 3. *Cedrus Deodara*, 3. *Cephalataxus Fortunei*, 2. *Chamærops Fortunei*, 2. *Chimonanthus fragrans*, 3. *Choisya ternata*, on wall, 3. *Colletia cruciata*, 2 ; *C. ferox*, 2. *Convolvulus Cneorum*, on wall, 3. *Cordia Franciscea*, on wall, 3. *Cratægus Pyracantha*, 3. *Cryptomeria japonica*, 2. *Cunninghamia sinensis*, 3. *Daphne oleifolia*, 3. *Desfontainea spinosa*, on wall, 2. *Duvana spinescens*, on wall, 2. *Edwardsia MacNabiana*, on wall, 2. *Elæagnus argentea*, 3. *Eriobotrya japonica*, 3. *Escallonia coquimbensis*, on wall, 2 ; *E. macrantha*, on wall, 2 ; *E. montevidensis*, on wall, 1. *Eucalyptus globulus*, 1. *Eugenia Ugni*, on wall, 2. *Euonymus europæus*, 3. *Eurybia ilicifolia*, on wall, 1. *Fabiana imbricata*, on wall, 1. *Fremontia californica*, on wall, 3. *Fuchsia coccinea*, on wall, 3 ; *F. gracilis*, on wall, 3 ; *F. Thompsoni*, on wall, 3 ; *F. variegata*, on wall, 3. *Furze*, 3. *Griselinia littoralis*, 3. *Habrothamnus*, on wall, 1. *Helwingea rusciflora*, 2. *Idesia polycarpa*, 2. *Ilex elliptica*, 2 ; *I. dipyrrena*, 2. *Illicium floridanum*, 2. *Laurel*, Bay, 2. *Laurel*, common, 3 ; *L. Portugal*, 3. *Leycesteria formosa*, 3. *Litrea caustica*, 2. *Magnolia grandiflora*, 3. *Nandina domestica*, 1. *Negundo fraxinifolia*, 3. *Pampas grass*, 1. *Passiflora cœrulea*, on wall, 1. *Paulownia imperialis*, 2. *Philippodendron regium*, 2. *Photinia serrulata*, 2. *Pittosporum Buchananii*, on wall, 2. *Podocarpus andina*, 2. *Podocytisus caramanicus*, 3. *Rosemary*, 1. *Saxegothæa conspicua*, 3. *Sequoia gigantea*, 2. *Veronica salicifolia*, 1. *V. Traversi*, 2. *Xanthoxylon planispinum*, 2. *Yucca aloifolia*, 3 ; *Y. filamentosa*, 3 ; *Y. gloriosa*, 3.

Plants uninjured—*Abelia triflora* on wall, *Abies Douglasii*, *Amelopsis hederacea*, *A. Veitchii*, *Araucaria imbricata*, *Arbutus An-*

drachne, *A. quercifolia*, *Aristolochia Sipho*, *Arthrotaxis selaginoides*, *Aucuba japonica*, *Azalea amæna*, *Berberis Darwinii*, *B. japonica*, *B. vulgaris*, *Biota orientalis*, *Broussonetia papyrifera*, *Buxus balearica*, *B. sempervirens*, *Carpentaria californica* on wall, *Cassia bifoliata* on wall, *Castanea vesca*, *Catalpa syringæfolia*, *Ceanothus velutinus*, *Cedrus Atlantica*, *C. Libani*, *Cercis siliquastrum*, *Cistus ladaniferus*, *Clematis Jackmanni*, *C. montana*, *Cleyera japonica*, *Colutea arborescens*, *Comptonia asplenifolia*, *Cotoneaster microphylla*, *C. Simonsii*, *Cytisus Laburnum*, *C. scoparius*, *Do. fl. pl.*, *Daphne collina*, *D. indica*, *D. Mezereum*, *Deutzia scabra*, *Elm*, *Enkianthus nivalis*, *Escallonia Philippiana* on wall, *Fitzroya patagonica*, *Forsythia elegans*, *F. viridissima*, *Garrya elliptica*, *Gleditschia horrida*, *Gordonia japonica*, *Gunnera scabra*, *Halesia tetraptera*, *Ivy*, *Do. variegated*, *Hibiscus syriacus*, *Holly*, *Do. variegated*, *Hypericum balearicum*, *H. Calycinum*, *Illicium religiosum*, *Jamesia americana*, *Juniperus*, *Kalmia latifolia*, *Kœlreuteria paniculata*, *Larch*, *Laurustinus*, *Ligustrum lucidum*, *L. sinense*, *L. vulgare*, *Lilac*, *Limonia trifoliata*, *Liquidambar styraciflua*, *Lonicera fragrantissima*, *L. japonica*, *L. Periclymenum*, *Maclura aurantiaca*, *Magnolia conspicua*, *M. Lennii*, *M. stellata*, *Menziesia polifolia*, *Mulberry*, *Olearia Haastii*, *Osmanthus aquifolius*, *Paliurus aculeatus*, *Pampas grass*, *Pavia macrostachya*, *Peraphyllum ramosissimum*, *Phillyrea angustifolia*, *P. media*, *Piptanthus nepalensis*, *Plane*, *Quercus Damio*, *Q. Ilex*, *Q. robur*, *Q. Suber*, *Rhus copallina*, *R. glabra*, *R. japonica Osbeckii*, *R. sylvestris*, *R. Typhina*, *Ruscus aculeatus*, *Salisburyia*, *Santolina chamæcyparis*, *Skimmia japonica*, *Wallflowers*, *Walnut*, *Weigela rosea*, *Wistaria sinensis*, *Xanthoxylon schinifolium*.

1. SUSSEX—E. GRINSTEAD, Forest Row.—H. J. Slack, Esq.

Alt. and Exposure—407 ft. ; 20 to 30 ft., more or less on N. slope of Ashdown Forest range.

Rainfall, 1880—[Alt., 386 ft. ; ht., 3 ft. 7 ins. ; 31·68 ins.].

Min. Temps. and Dates—Jan. 16th, 17th, 9° : [Crowborough Beacon, dist., 6 ms., S.E. ; alt., 780 ft. ; Jan. 22nd, 9°].

Plants injured, 1880-81—14 (1), 15 (2), 17 (3)—*Arbutus Unedo*, 1, 2. *Berberis Darwinii*, 2, 3. *B. aquifolia*, 3. Brussels sprouts, 2. *Buddleia globosa*, 1879-80, 3 ; 1880-81, kd. to grd., 1, 2. *Chamærops Fortunei*, exposed, 1 ; sheltered by Fir trees, 3. *Chimonanthus fragrans*, 2. *Cistus ladaniferus*, 1. *Clematis Jackmanni*, 3. *Cupressus*

macrocarpa, 2. Daphne Laureola, 1, 2. Desfontainea spinosa, 2. Deutzia gracilis, 3. Eucalyptus globulus, 1. Eugenia Ugni, 1. Euonymus radicans, 1, 2. Forsythia viridissima, 3. Furze, 3. Ilex japonica, 2. Laurel, Bay, 2; sheltered, 3. Laurel, common, 3; L. Portugal, 3. Laurustinus, 2, 3. Lavander, 3. Leycesteria formosa, 3. Lilium auratum, 1. Lonicera japonica, 3. Pinus insignis, 2. Piptanthus nepalensis, 3. Quercus Ilex, 3. Retinospora ericoides, 1, 3; Rosemary, 1. Roses, dwfs., 1, 2; H. P., 1, 2; Stands., 1, 2. Sequoia gigantea, 1879-80, 2; 1880-81, 3.

Plants uninjured—Abies Douglasii, Araucaria imbricata, Aristolochia Siphon, Asparagus, Aucuba japonica, Biota orientalis, Cedrus Atlantica, Cercis siliquastrum, Cryptomeria elegans, Cupressus Lawsoniana, Cytisus Laburnum, Deutzia scabra, Jasminum nudiflorum, Juniperus, Kale, Kalmia latifolia, Kœlreuteria paniculata, Lilium excelsum, L. lancifolium, Picea Nordmanniana, Pinus excelsa, P. Laricio, P. sylvestris, Retinospora pisifera aurea, Salisburia, Skimmia japonica, Taxodium distichum, Tritoma uvaria, Weigela rosea, Wistaria sinensis, Yew, Yucca aloifolia.

Observations—Conifers, the winter was fatal to many kinds pruned in the previous autumn. Eucalyptus globulus, does not stand any winter here, unless *well sheltered*; and even then, scarcely, if the frost is sharp.

2. HASLEMERE, Valewood.—J. H. Mangles, Esq.

Alt.—500 ft.; situate on W. border of Sussex.

Min. Temps. and Dates—[Abinger Hall, dist., 15 ms., N.E.; Jan. (25th ?), 0°].

Plants injured, 1880-81—Rhododendrons, Hybrids with a strong affinity to R. arboreum, 2, 3; many "Types" of this sp. discoloured or hurt. R. argenteum, 2. R. calophyllum, 2; the wood of this sp. was split and cracked by the frost, and in plants which had stood out for several years; but as it makes its growth late, it is apt to offer unripe wood to the early frosts. R. ciliatum, 3. R. Edgeworthii, 1. R. Falconeri, 2, 3. R. Fortunei, 3; not injured in foliage, but young shoots were cut back as usual in spring; Hybs. between this and R. Thomsoni were seriously hurt, though they have since recovered. R. glaucum, 3. R. maximum, many frozen through, 1. R. niveum, lost leading buds, but soon replaced them, 3. R. ponticum, many frozen through, 1.

Plants uninjured—Azalea indica, alba, large bushes never bloom-

ed better than in 1881. *A. amæna*, hybs. between this sp. and a garden var., preserved their blossom buds and opened them securely. *A. mollis*, stood well. *A. pontica* and American types and hybrids, were also uninjured. *Rhododendron barbatum*, *R. Blandfordiæflorum*, *R. campylocarpum*, *R. cinnabarinum*, *R. dahuricum*, *R. ferrugineum*, *R. hirsutum*, *R. lepidotum*, *R. maximum*, and *R. ponticum* hybs., *R. setosum*, *R. Thomsonii*, *R. triflorum*.

Observations—My obs. have been confined almost exclusively to *Azaleas* and *Rhododendrons*; these plants, as is well known, are principally injured by spring frosts; but during the past winter some very unusual results of the winter's cold have been observable. During 20 years I have never before known the blossom buds of *R. maximum* and of *R. ponticum* injured in this locality; but in the winter of 1880-81, many of them were frozen through. Experience has taught me that with this class of plants, it is not the amount of cold which tells, but rather the time when the cold is experienced, and the circumstances attending the thaws. I have been in the habit of breaking off the buds and examining them and I find as a rule that a mid-winter cold has little effect, but early autumnal and late spring frosts do the injury. The past winter, however, has been an exception to this rule, for the blossom buds of many were fairly frozen through by the mid-winter's severity.

3 HASTINGS, Glenleigh.—Mr. M. R. Dixon.

Rainfall, 1880—31·02 ins.

Min. Temp. and Date—Jan. 19th, 4°.

Plants injured, 1880-81—7 (1), 21 (2), 14 (3),—*Abies Douglasii*, 3. *Artichoke*, globe, 2. *Arundo conspicua*, 3. *Aucuba japonica* variegata, 3. *Azalea indica*, 2. *Berberis Darwinii*, 3. *Broccoli*, 1. *Buddleia globosa*, 2. *Camellia*, 2. *Cauliflower*, 1. *Cercis siliquastrum*, 2. *Cryptomeria elegans*, 3. *C. japonica*, 3. *Cupressus Lambertiana*, 3. *Erica*, 3. *Escallonia macrantha*, 2. *Eucalyptus globulus*, 2. *Euonymus japonicus*, 2. *E. radicans*, 2. *Furze*, fl. pl., 2. *Garrya elliptica*, 3. *Kalmia latifolia*, 2. *Laurel*, Bay, 2. *Laurel*, common, 2; *L. Portugal*, 2. *Laurustinus*, 2. *Lettuce*, 1. *Ligustrum lucidum*, 2. *Myrtle*, 1. *Oak*, 3. *Pampas grass*, 3. *Parsley*, 3. *Picea grandis*, 2. *P. Pinsapo*, 2. *Pinus insignis*, 1, 2. *Roses*, stands., 3; *Tea*, 3. *Stocks*, 1, *Sequoia gigantea*, 2. *Veronica salicifolia*, 1. *Yucca filamentosa*, 2.

Plants uninjured—Almond, Apples, Apricots, *Araucaria imbricata*,

Arbutus Unedo, Asparagus, Aucuba japonica, Azalea amæna, Berberis japonica, B. vulgaris, Biota (Thuja) orientalis, Brussels sprouts, Buxus balearica, B. sempervirens (Box), Cabbages, Carnations, Castanea vesca, Catalpa syringæfolia, Cedrus Atlantica, C. Deodara, C. Libani, Cotoneaster Simonsii, Cratægus Pyracantha, Cupressus borealis, C. Lawsoniana, C. macrocarpa, Currants, Cytisus Laburnum, Daphne Laureola, Deutzia scabra, Euonymus europæus, Forsythia elegans, F. viridissima, Furze, Hibiscus syriacus, Holly, H. variegated, Hyacinths, Hypericum Calycinum, Ivy, Jasminum nudiflorum, Larch, Lonicera japonica, L. Periclymenum, Medlar, Mulberry, Narcissus, Nectarines, Onions, Paulownia imperialis, Peaches, Pears, Phillyrea angustifolia, P. medica, Picea Nordmanniana, Pinus insignis, P. Laricio, P. sylvestris, Podocarpus chinensis, Pyrus japonica, Quercus Ilex, Quince, Retinospora, Rhododendrons, Ribes, Rosemary, Roses, Ruscus aculeatus, Salisburia, Weigela rosea, and Wistaria sinensis.

4. HORSHAM, Newells.—Mr. C. S. Dickins.

Gen. Char. of Soil—Light.

Alt. and Exposure—340 ft.

Rainfall, 1880—[(Leonardslee), alt., 273 ft. ; 37·1 ins.].

Min. Temps. and Dates — [Hayward's Heath, dist., 10 ms., E. ; Jan. 22nd, 23rd, 8°].

Plants injured, 1880-81—7 (1), 5 (2), 4 (3)—Abies Douglasii, 3. Arbutus Unedo, 3. Arundo conspicua, 2. Broccoli, all, 1. Catalpa syringæfolia, 2. Cauliflower, all, 1. Coronilla glauca, 1. Euonymus japonicus, 2. Fuchsia, 1. Laurel, common, 3 ; Do. Portugal, 3. Laurustinus, 2. Myrtle, 1. Passiflora cœrulea, 1. Picea Pin-sapo, 2. Pinus insignis, 1.

Plants uninjured—Azaleas, Camellias and Rhododendrons flowered well for the most part, and had a great show of bloom (May 14th).

5. PEVENSEY, Westham.—Mr. W. Shipman.

Rainfall, 1880—[Pevensay, dist., 1 m. ; 31·12 ins.].

Date of Onset and Duration of Frost — Jan. 18th, 12 ins. of snow and N.E. gale, with temp. 12°, killed many shrubs and plants.

Min. Temps. and Dates—[St. Leonard's, dist., 10 ms., E. ; alt., 116 ft. ; Jan. 22nd, 16°·7 : Hastings, Jan. 19th, 4° : Eastbourne, dist., 4 ms., W. ; alt., 24 ft. ; Jan. 22nd, 15°·1].

Plants injured, 1880-81—11 (1), 18 (2)—Aucuba japonica, 2 ; Do. variegata, 2. Broccoli, 1. Brussels sprouts, 1. Cabbages, 2. Carnations, 2. Celery, 2. Endive, 1. Euonymus europæus, 2 ; E.

japonicus, 2; *E. radicans*, 2. Holly, 2. Do. variegated, 2. Ivy, 2. Kale, 1. Laurel, Bay, 1. Laurel, common, 2. Laurustinus, 1. Lavander, 2. Lettuce, 1. Onions, winter, 2. Parsley, 2. Penstemons, 1. Rhododendrons, 2. Roses, dwfs., 2; H. P., 2; Standards, 1; Tea, 1. *Tritoma uvaria*, 2. Wallflower, 1.

Observations—Deciduous trees and shrubs do not seem to be injured much, as the wood ripened so well last summer (1880). Evergreens and Ivies lost all their foliage; Fruit trees were about 14 to 21 days later in flowering this year. Roses, on own roots, are killed back 6 or 8 inches.

6. UCKFIELD, Buxted Pk.—Mr. H. Prinsep.

Gen. Char. of Soil—A heavy loam.

Alt. and Exposure—Kitchen garden, 100 ft.; pleasure grounds from 100 to 190 ft.; exposed on all sides.

Rainfall, 1880—Alt., 194 ft.; 32.10 ins.

Min. Temps. and Dates—[Jan. 22nd ?], 2°: [Uckfield (Oaklands), dist., 1 mile; Jan. 22nd, 4°].

Plants injured, 1880-81—14 (1), 17 (2), 23 (3)—*Aloysia citriodora*, 2. *Aralia Sieboldii*, 3. *Arbutus Unedo*, 3. *Aristolochia*, protected, 3. *Arundo Donax*, 2. *Asparagus*, 2. *Aucuba japonica*, 2. *Azalea amæna*, 2. *Bambusa Fortunei*, 1. *Berberis Darwinii*, 2. *B. japonica*, 3. Broccoli, 1. Brussels sprouts, 3. *Buddleia globosa*, 3. *Catalpa syringæfolia*, 3; *Do. aurea*, 1. *Cedrus Deodara*, 1. Celery, 1. *Cercis siliquastrum*, 3. *Cratægus Pyracantha*, 2. *Cryptomeria elegans*, 3; *C. japonica*, 3. *Desfontainea spinosa*, 1. *Escallonia macrantha*, 2; *E. montevidensis*, 1. *Eugenia Ugni*, 1. *Euonymus japonicus*, 2; *E. radicans*, 2. *Forsythia elegans*, 2. Gooseberries, 3. *Griselinia littoralis*, 1. *Hypericum Calycinum*, 2. *Jasminum nudiflorum*, 2. *Laurustinus*, 3. *Leycesteria formosa*, 1. *Magnolia grandiflora*, 3. Myrtle, 1. Nectarines, 3. *Olearia Haastii*, 3. *Osmanthus aquifolius*, 1; *O. ilicifolius*, 1. *Passiflora cœrulea*, 2. *Paulownia imperialis*, 3. Peaches, 3. *Picea pectinata*, 3; *P. Pindrow*, 3. *Pinus insignis*, 3. *Pittosporum Tobira*, protected, 3. *Podocarpus andina*, 3. *Quercus Ilex*, 3. *Rhus Typhina*, 3. *Santolina chamæcyparis*, 1. *Tritoma uvaria*, 2. *Weigela rosea*, 2. *Yucca aloifolia*, 3.

Plants uninjured — *Abies Douglasii*, *A. Morinda*, *Ampelopsis Veitchii*, *Araucaria imbricata*, Borecole, *Clematis Jackmanni*, *C. montana*, *Cotoneaster microphylla*, *C. Simonsii*, *Cytisus Laburnum*,

Daphne Laureola, *D. Mezereum*, *Deutzia scabra*, *Kœlreuteria paniculata*, *Retinosporas*, *Yucca filamentosa*, *Y. gloriosa*.

7. UCKFIELD, Oaklands.—Mr. E. Luckhurst.

Gen. Char. of Soil—Thin, poor, silicious loam upon the Hastings sand formation.

Alt. and Exposure—400 ft., on S. slope of forest ridge, sheltered by trees on N.E. and W. Wind from N.E. often does much harm in spring.

Rainfall, 1880—[Buxted Pk., dist., 2 ms.; alt., 193 ft.; 32·10 ins., on 163 days].

Date of Onset and Duration of Frost—Jan. 10th to 26th: temps., on 13th, 18°; 14th, 14°; 15th, 18°; 16th, 13°; 22nd, 4°.

Min. Temp. and Date—Jan. 22nd, 4°.

Plants injured, 1880-81 — 12 (2), 3 (3)—*Arbutus Unedo*, 2. *Artichoke*, globe, 2. *Arundo Donax*, 2. *Berberidopsis corollina*, lost foliage and ends of branches, 2; two plants on S. aspect, growing freely again from the base. *Buddleia globosa*, 3. *Ceanothus azureus*, 3. *Colletia cruciata*, 3. *Eugenia Ugni*, 2. *Hydrangea Hortensea*, 2. *Laurustinus*, 2. *Lonicera brachypoda*, 2; *L. flexuosa*, 12 years old, 20 ft., on E. aspect, 2. *Phormium tenax*, 2. *Roses*, *Banksian* and *Tea*, 2.

Plants uninjured — *Colletia ferox*, *Elæagnus*, *Escallonia*, *Fitzroya patagonica*, *Forsythia elegans*, *Fuchsia coccinea*, *Garrya elliptica*, *Gunnera scabra*, *Bay Laurel*, *Osmanthus aquifolius*, *Pampas grass*, *Podocarpus andina*, *Veronica*, *Wallflowers*.

DIVISION III.—S. MIDLAND COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881,
FROM BUCKINGHAMSHIRE, CAMBRIDGESHIRE, HERTFORDSHIRE,
HUNTINGDONSHIRE, NORTHAMPTONSHIRE AND OXFORDSHIRE.

BUCKS. *Rainfall*, great, July, Sept., and Oct.; total of yr., 5·51 ins., above av. (Slough). *Min. rainfall*, Aylesbury (Mentmore), 29·40 ins.: max., Aylesbury, alt., 280 ft.; ht., 1 ft.; 38·70 ins., on 155 days. *Min. temps.*, Addington, alt., 309 ft.; Jan. 22nd, 0°: Brickhill Manor, Jan. 22nd, 1°.

Plants injured, 1880-81—30 (1), 40 (2), 18 (3), total at 3 places.

CAMBS. Drought in Jan., March, May; then wet till end of yr. (Aug. excepted). *Rainfall* of Oct. was nearly 22 p. c. of total for yr., producing destructive floods (Cambridge); 5·5 ins. above av. of 7 yrs. (March). *Min. rainfall*, Cherryhinton, alt., 35 ft.; ht., 1 ft.; 23·02 ins., on 173 days: max., Caxton, alt., 127 ft.; ht., 1 ft.; 33·95 ins., on 140 days. *Min. temps.*, Cambridge, Jan. 21st, 2°; Do., alt., 90 ft.; 4°: Royston, alt., 269 ft.; Jan. 22nd, 7°·7.

Plants injured, 1880-81—15 (1), 27 (2), 13 (3), total at 1 place (Bot. Gard.).

HERTS. *Rainfall*, sixth yr. above av. (Berkhampstead). *Min. rainfall*, Datchworth Rectory, alt., 357 ft.; ht., 1 ft.; 25·71 ins., on 156 days: max., Gt. Berkhamstead, alt., 370 ft.; ht., 1 ft. 5 ins.; 36·12 ins., on 158 days; av. of 30 yrs., 24·06 ins. (Hitchin). *Min. temps.*, Hitchin, alt., 28 ft.; Jan. 20th, 5°: Berkhamstead, alt., 370 ft.; Jan. 21st., 5°: Rothamstead, alt., 419 ft.; Jan. 21st., 5°: Watford, alt., 223 ft.; Jan. 21st, 6°·4: Throcking, alt., 484 ft.; Jan. 22nd, 10°·7.

Plants injured, 1880-81—62 (1), 39 (2), 19 (3), total at 3 places.

HUNTS. *Min. rainfall*, Whittlesea Mere, 29·95 ins.: max., Huntingdon, alt., 52 ft.; ht., 4 ins.; 33·12 ins., on 161 days. *Min. temps.*, Houghton, Jan. [21st?], 3°: mean of month, 16°.

Plants injured, 1880-81—16 (1), 41 (2), 15 (3), total at 1 place.

NORTHAMPTONSHIRE. *Rainfall*, excessive, June, July; crops

damaged (Hargrave). Min. rainfall, Northampton (Little Houghton), ht., 2 ft. 4 ins.; 30·22 ins., on 158 days: max., Thorpe Mandeville, alt., 555 ft.; ht., 1 ft.; 36·25 ins., on 162 days. *Min. temps.*, King's Sutton, Jan. 21st, -3°: Floore, alt., 300 ft.; Jan. 21st, -1°: Northampton, alt., 253 ft.; Jan. 19th, 8°.

Plants injured, 1880-81—42 (1), 51 (2), 24 (3), total at 5 places.

Oxon. Year, wetter than 4 preceding, but with 5 fine weeks in Aug. and Sept. (Banbury). Hard frost from Jan. 7th, 1881, to 27th (Oxford). *Min. rainfall*, Oxford, alt., 186 ft.; ht., 1 ft.; 30·04 ins., on 169 days: max., Stonor Pk., alt., 400 ft.; ht., 1 ft.; 40·71 ins., on 176 days. *Min. temps.*, Wootton, Jan. 22nd, -5°; Oxford, alt., 210 ft.; Jan. 22nd, 7°: Banbury, alt., 343 ft.; Jan. 15th, 7°: Wroxton, alt., 197 ft.; Jan. 22nd, 8°·5.

REPORTS.

1. BUCKS—BLETCHLEY, Brickhill Manor.—Mr. G. Bloxham.

Gen. Char. of Soil—Light, shallow and very sandy, resting upon the New Red Sandstone rock.

Alt. and Exposure—Nearly 300 ft., much exposed to S.W., sheltered on N. and N.E.

Rainfall, 1880—[Newport Pagnell, dist., 6 ms., N., 30·50 ins.].

Date of Onset and Duration of Frost—The winter months were generally fine and mild with an occasional frost; Nov. 20th, 26°; 21st, 21°; 22nd, 15°; on 23rd, 40°; the next frost being on Dec. 25th, 24°; 26th, 23°; on 28th, temp. rose to 45° at 10 p.m. Snow fell on 27th, 28th and 30th; on 31st temp. fell to 28°. Up to this date every thing appeared to be uninjured. On Jan. 1st, 1881, the temp. was 27°. Winter set in on Jan. 12th, temp. 20°, and continued with unusual severity until the 27th; when the temp. rose to 36° and a general thaw set in.

Min. Temp. and Date—Jan. 22nd, 1°.

Plants injured, 1880-81—4 (1), 10 (2), 15 (3)—Apricots, 3. Artichoke, globe, 2. Borecole, 3. Broccoli, Carter's late White, Cooling's Matchless, Leamington, Penzance Early White and Veitch's Spring White, all, 1. Brussels sprouts, 2. Cedrus Deodara, 3. Celery, 2. Cherries, Bigarreau, Frogmore early, May Duke, 2. Crataegus oxyacantha, fl. pl., 3; C. Pyracantha, 3. Cryptomeria elegans,

3. Endive, 1. *Garrya elliptica*, 3. Holly, variegated, 3. Kale, 3. *Kalmia latifolia*, 3. Laurel, Bay, 2. Laurel, common, 2. *Laurus-tinus*, 2. Lavander, 3. Lettuce, Bath Cos, 3. *Lonicera fragrantissima*, 1. *Magnolia grandiflora*, 2. Parsley, 3. Rosemary, 1. Roses, Stands., briars, 2. *Santolina chamæcyparis*, 2. Strawberries, British Queen, Sir Charles Napier, 3. Wallflowers, 3.

2. TRING, Drayton Beauchamp.—Rev. H. H. Crewe.

Gen. Char. of Soil—A stiff clay on the top of chalk.

Alt. and Exposure—365 ft.

Rainfall, 1880—[Mentmore, 5 ms., N. ; 29·40 ins.].

Min. Temps. and Dates — [Berkhampstead, dist., 6 ms., N.E. ; alt., 370 ft. ; Jan. 21st, 5°].

Plants injured, 1880-81—13 (1), 15 (2), 3 (3)—*Ampelopsis Veitchii*, 3. *Aster sikhimensis*, 1. *Berberis Darwinii*, 2. *Brugmansia sanguinea*, 1. *Buddleia globosa*, 1. *Clematis montana*, 2. *Convulvulus althæoides*, 1. *Dictamnus Fraxinella*, alba, 2. *Eurybia ramulosa*, 1. *Gaura Lindheimeri*, 1. *Garrya elliptica*, 2. *Iberis gibraltarica*, 1. Laurel, Bay, 2. Laurel, common, 1 ; L. Portugal, 3. *Laurustinus*, 2. *Leucocrinum montanum*, 1. *Libertia ixioides*, 1. *Lonicera fragrantissima*, 2. *Oenothera macrocarpa*, 1. *Origanum dictamnus*, 1. *Rosa Banksiæ*, 2 ; *R. Brunonis*, 2 ; *R. moschata*, 2 ; *R. sericea*, 2 ; Tea, 1, 2. Stocks, 1. *Tritoma uvaria*, 2. *Veronica salicifolia*, 2 ; *V. Traversi*, 2. Wallflowers, 1.

Plants uninjured—*Arnica Zygomeris*, *Hyacinthus candidus*, *Indigofera decora*, *Lilium Krameri*, *Lychnis grandiflora*, *Mirabilis multiflora*, *Mitraria coccinea*, *Orchis foliosa*, *O. sambucina*.

3. WINSLOW, Addington Manor.—Mr. T. Matthison.

Gen. Char. of Soil—Generally clay, with patches of gravelly soil, with a subsoil of stiff tenacious clay, holding a great deal of water in spite of drains.

Alt. and Exposure—309 ft. ; open, on the top of a ridge, sloping gently away to S., also to N. and W.

Rainfall, 1880—33·99 ins. ; above av., every yr. since 1874.

Date of Onset and Duration of Frost—Oct. 21st, 26° ; Nov. 22nd, 17°. Weather not severe again until Jan. 12th ; when temp. fell to 6°, 4°, 9°, 8°, on 14th, 15th, 16th and 17th. On 22nd, 0° ; on 24th, 3° ; and on 27th the great frost may be said to have left us.

Min. Temp. and Date—Jan. 22nd, 0°.

Plants injured, 1880-81—13 (1), 15 (2)—*Arbutus Unedo*, 1.

Artichoke, globe, 2. *Aucuba japonica*, variegata, 2. *Berberis Darwinii*, 2. Borecole, 2. Broccoli, 1. Brussels sprouts, 1. Celery, 1. *Cistus ladaniferus*, 1. *Cotoneaster microphylla*, 2. *Cupressus macrocarpa* (large tree), 2. Furze, in places, 1. *Garrya elliptica*, 1. *Griselinia littoralis*, 1. *Hibiscus syriacus*, 2. Ivy, 2. Laurel, Bay, 1. Laurel, common, 2; Do. Colchica, 2; Do. Caucasica, 2; L. Portugal, 2. *Laurustinus*, 1. Pampas grass, 1. Peaches, 2. *Phillyrea* (sorts), 2. *Podocarpus andina*, 1. *Taxodium distichum*, 2. *Tritoma uvaria*, 1.

Observations—I cannot help thinking that the wet sunless seasons we have had for some years has weakened the constitution of trees and shrubs and made them unable to resist very severe frost; and that the great amount of injury done to trees, shrubs and vegetables was much owing to the excessive rainfall combined with low temperature, thereby causing a succulent and unripened growth, so that they could not bear the strain of severe weather. I also think that more damage was done to vegetation of all kinds on the 18th and 19th of January, when there was not more than nine degrees of frost [23°]; because the frost was accompanied by such a fearful gale of wind lashing and breaking every thing into pieces. Shrubs of every description on the side exposed to the gale suffered to a great extent. *Arbutus*, of the one or two left from last winter, the stem and branches were split open and quite dead. Several trees of *Cedrus Deodara* were very much hurt. Common Laurel, the Colchican and Caucasian vars. and Portugal Laurels must all be removed; as well as a *Cupressus macrocarpa*, and a fine specimen of *C. MacNabiana*. *Phillyreas* of different kinds have been most severely handled. Of *Quercus Ilex*, of different kinds, many have been killed and all denuded of their leaves. Vegetables, in the autumn I never saw a finer assortment of well grown winter garden produce; but every thing has been destroyed. Broccoli of all kinds, Brussels sprouts, Cabbages, Curled Greens and Kale (*Cottagers*) have all suffered alike. Savoy had been previously used.

1. CAMB.—CAMBRIDGE, Botanic Gardens.—Mr. R. Irwin Lynch.

Gen. Char. of Soil—Light on gravel.

Alt. and Exposure—[About 50? ft.]. Protected on N., ground sloping to W. Moderately open.

Rainfall, 1880—23·17 ins.

Date of Onset and Duration of Frost—During December, 1880,

there was no very severe cold ; the lowest temperature being 27° on 26th, Rainfall, 3.25 ins. Mean. temp. from 1st to 12th was $30^{\circ} \cdot 8$; from 13th to 26th, $13^{\circ} \cdot 6$; from 27th to 31st, $31^{\circ} \cdot 1$.

Min. Temps. and Dates—The lowest temps. appear to have occurred only between the 13th and 26th. On grass, Jan. 22nd, $14^{\circ} \cdot 5$: at depth of 1 ft., Jan. 22nd, 24° ; at 2 ft., Jan. 23rd—29th, $33^{\circ} \cdot 5$: min. temp. in air, Jan. 21st, 5° .

Plants injured, 1880-81—15 (1), 27 (2), 13 (3)—*Abies Douglasii*, 3. *Aralia Sieboldii*, 2. *Arundo conspicua*, 2 ; *A. Donax*, 2. *Aucuba japonica*, variegata, 2. *Berberis Darwinii*, 2 ; *B. japonica*, 3. Borecole, 1. Broccoli, 1. Brussels sprouts, 2. *Buddleia globosa*, 1. *Buxus balearica*, 1. *Catalpa syringæfolia*, old tree, 2. *Cedrus Deodara*, 2, in 1879-80, 1. *Cercis siliquastrum*, 3. *Chamærops excelsa*, protected, 1. *Colletia ferox*, 1. *Cotoneaster microphylla*, 2, in 1879-80, 1. *Cupressus sempervirens*, 1. *Dracæna australis*, 2. *Escallonia Ingrami*, 2 ; *E. macrantha*, 1 ; *E. montevidensis*, 2 ; *E. rubra*, 1. *Eucalyptus globulus*, 1. *Eugenia Ugni*, 1. *Euonymus japonicus*, 2. *Fuchsia gracilis*, 2 ; *F. Riccartoni*, 2. Furze, 2 ; *Do. fl. pl.*, 2. *Garrya elliptica*, 2. *Gunnera scabra*, 3. *Hydrangea Hortensea*, 2. Laurel, Bay, 2. Laurel, common, var *Colchica*, 2 ; var. *Caucasica*, 3 ; L. Portugal, only one or two plants, 2. *Laurustinus*, 2. *Leycesteria formosa*, 1. *Maclura aurantiaca*, 3. *Paulownia imperialis*, 3. *Phillyrea angustifolia*, 1 ; *P. media*, 3. *Quercus Ilex*, 3. *Rhus glabra*, 3. *Ribes speciosa*, 2. *Ruscus aculeatus*, 3. *Spartium junceum*, 3. *Taxodium distichum*, 3. *Veronica salicifolia*, 1.

Plants uninjured—*Ampelopsis hederacea*, *A. Veitchii*, *Araucaria imbricata*, *Asparagus*, *Berberis vulgaris*, *Biota orientalis*, Brussels sprouts (alone of Brassica family in private garden ; all others, Cabbages, Borecole, Broccoli and Cauliflower having been killed), *Castanea vesca*, *Catalpa syringæfolia*, young plant, *Cedrus atlantica*, *C. Deodara*, two plants only, *Cephalotaxus Fortunei*, *Cistus ladaniferus*, *Clematis montana*, *Cratægus oxyacantha*, fl. pl. ; *C. Pyracantha*, *Cryptomeria japonica*, *Cupressus Lawsoniana*, *Cytisus Laburnum* ; *C. scoparius*, *Deutzia scabra*, *Ecremocarpus scaber* protected below by snow, Elm, *Euonymus europæus*, *E. radicans*, *Gleditschia horrida*, *G. inermis*, *G. triacanthos*, *Hydrangea arborescens*, *Larix europæa*, *Ligustrum vulgare*, Lilac, *Liquidambar styraciflua*, Medlar, *Negundo fraxinifolia*, Parsley, *Picea amabilis*, *P. Nordmanniana*, *P. Pinsapo*, *Pinus excelsa*, *P. Laricio*, *P. sylvestris*, *Platanus orientalis*, *Podo-*

carpus Koriana, Pyrus japonica, Quince, Rhus Typhina, Salisburia, Sequoia gigantea, S. sempervirens, Taxus baccata, Do. fastigiata, Weigela rosea, Wistaria sinensis, Yucca filamentosa, Y. gloriosa.

1. HERTS—CHESHUNT.—Mr. G. Paul.

Gen. Char. of Soil—Alluvial loam or "Brick earth."

Alt. and Exposure—60 to 75 ft.; valley, fairly wooded.

Rainfall, 1880—[Enfield, dist., 4 ms., S.; alt., 108 ft.; ht., 3 ft.; 31·11 ins., on 168 days].

Min. Temp. and Date—[Enfield, alt., 300 ft.; Jan. 21st, 7°·9].

Plants injured, 1880-81—48 (1), 22 (2), 7 (3)—Aloysia citrodora, 1. Apples, 3. Apricots, 3. Araucaria imbricata, 3. Arbutus Andrachne, 2; A. procera, 1; A. Unedo, 1. Artichoke, globe, 2. Azalea indica, 1. Benthamia fragifera, 1. Berberidopsis corallina, 1. Broccoli, all, 1. Broussonetia papyrifera, 3. Buddleia globosa, 1. B. Lindleyana, 1. Bupleurum fruticosum, 2. Buxus balearica, 2. Carnations, 1. Cauliflower, all, 1. Ceanothus americanus, 1; C. azureus, 1; C. dentatus, 1; C. grandiflorus, 1; Cedrus Deodara, a few, 1; others, 3. Chamærops Fortunei, 1. Choisya ternata, 2. Cistus ladaniferus, 2. Citrus Aurantium, 1. Colletia cruciata, 2; C. ferox, 2. Cupressus macrocarpa, 1; C. sempervirens, 1; C. torulosa, 1. Dahlia variabilis, 1. Daphne indica, 1. Desfontainea spinosa, 1. Dracæna australis, 1. Echeveria metallica, 1. Elæagnus pungens, 1. Embotrium coccineum, 1. Endive, 1. Eriobotrya japonica, 1. Escallonia Ingrami, 1; E. macrantha, 2; E. montevidensis, 2; E. rubra, 2. Eucalyptus globulus, 1; E. coccifera, 1. Eugenia Ugni, 1. Euonymus japonicus, 1. Fabiana imbricata, 1. Figs, 1. Furze, 2; fl. pl., 2. Garrya elliptica, 1. Grevillea rosmarinifolia, 1. Griselinia littoralis, 1. Habrothamnus, 1. Laurel, Bay, kd. to grd., 2. Laurustinus, 3. Lavander, 3. Leptospermum, lanigerum, 1; L. scoparium, 1. Magnolia grandiflora, 2. Do. Exmouth var., 2. Myrtle, 1. Nandina domestica, 1. Olearia Haastii, 2. Pampas grass, 1. Phormium tenax, 1. Photinia glabra, 2. Piptanthus nepalensis, 2. Quercus Ilex, 2; Q. Suber, 2. Raphiolepis ovata, 2. Rosemary, 1. Roses, dwfs., and H.P.'s, in many cases kd. to grd., 1; Stands., 2; Tea, 1.

2. HATFIELD, Brookman's Park. Mr. A. Grant.

Gen. Char. of Soil—A heavy yellow clay mixed with gravel.

Alt. and Exposure—412 ft. ; sheltered on N. and E.

Rainfall, 1880 — [Brockett Hall, dist., 6 ms., S.E. ; 30·17 ins., on 159 days].

Date of Onset and Duration of Frost, 1880-81—Oct. 3rd and 20th followed by heavy fall of snow, causing great destruction, principally amongst Oaks ; large branches 15 inches in diam. were snapped off. Nov. 22nd, 19°. Winter began in earnest on Jan. 10th, continuing frosty till 27th. April 21st, 25°. The frost cut off all Potatoes and Asparagus shoots. May 11th, 29° ; the frost slightly injured the Asparagus, the Potatoes severely. It destroyed some bush fruit and all Strawberry blossom open at the time.

Min. Temp. and Date—Jan. 17th, 12°.

Plants injured, 1880-81—10 (1), 13 (2), 7 (3)—Artichoke, globe, 2. Arundo Donax, 2. Asparagus, 3. Broccoli, Lander's Goshen, 1 ; Snow's White, 1. Brussels sprouts, 2. Celery, 2. Chimonanthus fragrans, 3. Cryptomeria elegans, 3. Dracæna australis, 3. Euonymus japonicus, 1. Hydrangea Hortensea, 2. Jasminum officinale, 2. Kale, 3. Laurel, common, 2 ; L. Portugal, 2. Laurustinus, 1, 3. Lavander, 1. Leycesteria formosa, 2. Pampas grass, 1. Pens-temons, 1. Phormium tenax, variegatum, 2. Rosemary, 1. Roses, dwfs., 3 ; Stands. on Briars, 10 p. c., 1 ; Tea, 1. Stocks, 1. Wall-flowers, 2. Yucca filamentosa, 2.

3. HARPENDEN and ROTHAMSTEAD. — Sir J. B. Lawes and Dr. Gilbert.

Gen. Char. of Soil—Loam, yellow clay and chalk.

Alt. and Exposure—Harpenden, 400 ft. : Rothamstead, 420 ft.

Rainfall, 1880—33·96 ins.

Date of Onset and Duration of Frost—Oct. 21st and 24th, 29° ; snow fell on 19th. The whole of Oct. characterised by excessive rainfall and low temp. Nov. 1st, sharp frost ; 2nd, 23°·7 : temp. below 32° eleven times ; min. temp., Nov. 22nd, 22°·2. Snow on 18th Dec. ; temp. below 32° eight times ; min. temp., 22nd, 25°·6. Snow, slight on 17th, heavier on 19th, 20th. Jan. 1881, frosts commenced on 7th, and continued on each day to 27th inclusive ; the min. temp. below 32° twenty-one times. Max. temp., from 12th to 22nd, and from 24th to 26th inclusive, was not above 32° ; on 14th it was 25°·7. Slight falls of snow five times, from 8th to 13th, and on 18th a heavy fall with a violent gale. Feb., a few slight frosts at beginning, and the last 8 days. Min. temp. below 32° thirteen

times. Snow on eight days, heaviest (4 to 5 ins.) on 20th. March 1st, min. temp., $21^{\circ}\cdot 2$. Several severe frosts at end of month: min. temp., 27th, $22^{\circ}\cdot 7$; below 32° thirteen times.

Min. Temp. and Date—Jan. 21st, 5° .

Plants injured, 1880-81—4 (1), 4 (2), 5 (3)—Broccoli, 1. Cabbages, 2. *Echeveria metallica*, 1. Furze, 3. *Gladiolus*, 3. Laurel, Bay, 2. Laurel, common, 3; L. Portugal, 3. *Laurustinus*, 2. Onions, winter, 1, 2. Roses, Standards, 3. *Tritoma uvaria*, 1.

Observations—In the winter of 1879-80, a *Magnolia grandiflora* growing to the top of the house with a S.E. aspect, lost every leaf and appeared to be nearly dead in the spring. I watered it liberally with a solution of phosphate of ammonia and nitrate of soda. The foliage returned and was exceedingly dark and luxuriant during the summer. During the last winter it has retained every leaf. I have no losses to report of trees or shrubs. The Ivy upon forest trees has suffered very much, but none is killed—(J. B. Lawes, Rothamstead). There is no doubt that the winter of 1880-81 had a serious effect upon a large proportion of vegetation at Harpenden and the immediate neighbourhood. The heavy fall of snow on the 19th of October was very disastrous to the trees, most of them being still heavily laden with their green and scarcely discoloured foliage, the Oaks being also laden with acorns. The extra weight imposed upon them by the fall of snow caused large branches to be severed from the trunks, making a complete havoc in places. Many shrubs, and especially those having a north and north-easterly aspect, have been greatly damaged, and in many cases quite killed by the frosts; the most marked of these being the *Laurustinus* and the Portugal Laurel. The few specimens of *Echeveria metallica* and *Tritoma uvaria* that grew in this neighbourhood have been killed, while *Aralia Sieboldii* has survived out of doors with very little protection indeed. Among other plants which have unexpectedly survived may be mentioned *Biota orientalis* and *Lilium lancifolium*; which latter plant has borne the winter better out of doors than when inside. The various species of *Picea* have also stood the winter well. *Laurus nobilis* (the Sweet Bay), Standard Roses, the common Laurel (*Prunus lauro-cerasus*), and the *Ulex europæa* (Furze), have all been more or less damaged by the frosts of winter, but more especially by the frosts of the early spring of 1881. In a large majority of cases the corms of *Gladiolus* have

rotted in the ground, but this probably is due to an excess of wet as much as the excess of frost. Broccoli of all kinds have been entirely killed, and winter Onions greatly suffered in the Rothamstead allotment gardens, and it is several years since spring Cabbages were so scarce, most of them having succumbed to the severity of the winter. (J. J. Willis, Harpenden, May, 1881.)

1. HUNTS—HUNTINGDON, Houghton.—Mr. T. Tilbrook.

Gen. Char. of Soil—Light loam resting on gravel.

Alt. and Exposure—Very flat and open, about 250 yards from the river Ouse.

Rainfall, 1880—Garden partly flooded in Oct., as it lies low and flat [Huntingdon, dist., 3ms.; alt., 52 ft.; 33·12 ins., on 161 days].

Date of Onset and Duration of Frost—Jan 10th to 29th; mean temp., 16°.

Min. Temps. and Dates—[Jan. 21st ?], 3°: [Cambridge, dist., 23 ms., S.E.; alt., 90 ft.; Jan. 21st, 4°].

Plants injured, 180-81—16 (1), 41 (2), 15 (3)—*Aloysia citrodora*, 1. Apples, 2. *Araucaria imbricata*, 1, 2. *Arbutus Unedo*, 1. Asparagus, 2. Broccoli, 1. Brussels sprouts, 2. *Buddleia globosa*, 1. Cabbages, 3. *Cedrus Deodara*, 2. Celery, 2. Cherries, 2. *Clematis Jackmanni*, 2. *Cryptomeria japonica*, 1. Endive, 1. *Eucalyptus globulus*, 1. *Euonymus japonicus*, 1. *Forsythia viridissima*, 2. Furze, 1; Do., fl. pl., 1. *Garrya elliptica*, 1. Laurel, Bay, 2. Laurel, common, 2. *Laurustinus*, 2. *Magnolia grandiflora*, 1, 2. Mulberry, 3. Nectarines, 2. Onions, winter, 3. Peaches, 2. *Picea cephalonica*, 3; *P. grandis*, 3; *P. lasiocarpa*, 3; *P. Pinsapo*, 3. *Pinus insignis*, 1. Plums, 2. *Quercus Ilex*, 2. Roses, H. P.'s, on dog and Manetti, 2; Stands., 1, 2; Tea, 2. *Sequoia gigantea*, 2. Strawberries, 2. Wallflowers, 1. *Wistaria sinensis*, 3. *Fruits*, vars. injured—Apples, Golden Harvey, 2; Ribston Pippins, 2. Cherries, Bigareau old, 2; Black Tartarean, 2; Do. Eagle, 3; Elton, 2; May Duke, 2. Nectarines, Hardwick's Seedling, 2; Imperatrice, 2; Lord Napier, 3; Violet Hative, 2; Standwick Elruge, 3; Pine Apple, 3. Peaches, Alexandra noblesse, 2; Barrington, 2; Princess of Wales, 2; Walberton, admirable, 2; Malta, 3. Plums, Jefferson, on wall, 2; Prince of Wales, standard, 2; Rein Claude de Baray, standard, 2; Victoria, on wall, 2. Strawberries, British Queen, 2; Dr. Hogg, 2; Keen's Seedling, 3; President, 3.

1. NORTHAMPTONSHIRE—DAVENTRY, Fawsley.—Lady Knightley.

Gen. Char. of Soil—Loam with a gravelly subsoil.

Alt. and Exposure—500 ft.; chiefly S.

Rainfall, 1880—[Weedon Beck, dist., 3 ms.; alt., 265 ft.; ht., 4 ft.; 34·70 ins., on 149 days].

Date of Onset and Duration of Frost—Oct. 20th and 28th, snow; Nov. 21st, 16°; great frost from Jan. 5th, 1881, to 27th. Temps. from 27° to 19° every night from March 23rd to 31st.

Min. Temps. and Dates—Jan. 14th, 8°; 15th and 20th, 9°; 21st, 7°: [Floore, dist., 6 ms., N.E.; alt., 300 ft.; Jan. 21st, -1°: Northampton, dist., 11 ms., S.; alt., 253 ft.; Jan. 19th, 8°].

Plants injured, 1880-81—4 (1), 10 (2), 3 (3)—*Aralia Sieboldii*, 1. Artichoke, globe, 2. Borecole, 2. Broccoli, 1. Brussels sprouts, 3. Cabbages, 3. Cupressus *Lawsoniana*, 2. Eucalyptus *globulus*, 1. Hydrangea *Hortensea*, 1; *H. japonica*, 2. Kale, 2. Laurel, common, 2. Laurustinus, 2. Lettuce, 3. Roses, stands, 2; Tea, 2. *Tritoma uvaria*, 2.

2. KETTERING, Barton Seagrave.—J. B. Tibbits, Esq., J.P.

Gen. Char. of Soil—Strong loam; and a damp soil.

Alt. and Exposure—230 ft.; W.S.W.; entirely sheltered from N. and E.

Rainfall, 1880—[Kettering, dist., 2 ms.; alt., 300 ft.; ht., 1 ft. 3 ins.; 32·41 ins., on 179 days].

Date of Onset and Duration of Frost—Jan. 9th, 1880, to 27th.

Min. Temp. and Date—Jan. 19th, 5°.

Plants injured, 1880-81—6 (1), 15 (2), 5 (3)—Artichoke, globe, 1. *Aucuba japonica*, 2. Broccoli, all, 1. Brussels sprouts, 2. *Buddleia globosa*, 1. Cabbages, 1. Carnations, 2. *Catalpa syriacæfolia*, 2. *Cedrus Deodara*, 2. *Cratægus Pyracantha*, 2. *Escalonia macrantha*, 2. Furze, fl. pl., 2. *Garrya elliptica*, 2. Holly, 2; Do. variegated, 3. Ivy, 2. Laurel, Bay, 1. Laurel, common, 1. Laurustinus, 2. Lettuce, 3. *Leycesteria formosa*, 3. *Magnolia grandiflora*, 2. Onions, 3. *Picea Pinsapo*, 3. Roses, stands, on briars, 2; Tea, 2.

3. NORTHAMPTON, Allthorpe Park.—Mr. E. Cole.

Gen. Char. of Soil—Rich, but rather wet.

Alt. and Exposure—299 ft.; exposed position.

Rainfall, 1880—32·93 ins., on 157 days.

Date of Onset and Duration of Frost—Nov. 2nd, 20°, with 11

days of frost. Dec. had 10 days of frost. Jan. had 26 days of frost. Feb. 15 days.

Min. Temps. and Dates—Jan. 21st, 0°; 22nd, 1°; 15th, 17th and 24th, 8°.

Plants injured, 1880-81 — 9 (1), 9 (2), 9 (3) — Apricots, 3. Asparagus, one year old, all, 1, 3. Aucuba japonica, 3. Broccoli, all (except Model which stood well), 1. Cedrus Libani, 3. Celery, 2. Conifers, all, 2. Cryptomeria elegans, 2; C. japonica, 3. Gooseberries, 2. Holly, 3. Juniperus Perkinsi, 1. Laurel, Bay, 2. Laurel, common and Portugal, all in exposed places, 1; those in more sheltered places are just recovering, 2. Laurustinus, 1. Lavander, 1. Peaches, 2. Rosemary, 1. Roses, H. P., on briars, 2; Tea, 1. Sequoia gigantea, 2. Strawberries, 3. Taxodium distichum, 3. Wallflowers, 1. Wistaria sinensis, 3.

4. WANSFORD, Thornhaugh.—Rev. J. Jenkyns.

Gen. Char. of Soil—Oolite, clayey but not heavy.

Alt. and Exposure—Close to a small stream.

Rainfall, 1880—[Easton, dist., 5 ms., N.E.; alt., 278 ft., 33.99 ins., on 189 days].

Date of Onset and Duration of Frost—Jan. 11th till 27th, 1881.

Min. Temp. and Date—Jan. 21st, 9°.

Plants injured, 1880-81—14 (1), 8 (2), 2 (3)—Abies Douglasii, 1. Ampelopsis Veitchii, 3. Apples, 3. Arbutus Unedo, 1. Aucuba japonica, 2; Do. variegated, 2. Broccoli, 1. Catalpa syringæfolia, aurea, 1. Cupressus macrocarpa, 1. Figs, 1. Forsythia viridissima, 1. Holly, 2. Ivy, 2. Laurel, Bay, 1. Laurel, common, 1; L. Portugal, 2. Laurustinus, 1. Lonicera japonica, 1. Myrtles, 1. Picea lasiocarpa, 2. Pinus insignis, 2. Privet, 2. Quercus Ilex, 1. Roses, Tea, 1.

5. WELLINGBOROUGH, Archfield.—Mr. G. Hillburn.

Gen. Char. of Soil—Blue lias clay, covered in many parts with red sand stone and limestone.

Alt. and Exposure—203 ft.

Rainfall, 1880—[Wellingborough (Croyland Abbey), 33.40 ins., on 194 days].

Min. Temp. and Date—[Northampton, dist., 10 ms., S.W.; alt., 253 ft.; Jan. 19th, 8°].

Plants injured, 1880-81—9 (1), 9 (2), 5 (3)—Araucaria imbricata, 2. Arbutus Andrachne, 2. Artichoke, globe, 1. Asparagus, 3.

Aucuba japonica, 3. Broccoli, Backhouse's winter white, Dilcock's bride, Early purple-sprouting, Elletson's mammoth, Leamington and Veitch's self-protecting, all entirely, 1. Brussels sprouts, 2. *Cedrus Deodara*, 1. *Clematis Jackmanni*, 3. *Cryptomeria elegans*, 2. *Cupressus macrocarpa*, 2. Ivy, 2. Laurel, Bay, 1. Laurel, common, 1; L. Portugal, 1. *Laurustinus*, 1. *Magnolia grandiflora*, 2. Onions, winter, 1. Peaches, 3. *Picea Pinsapo*, 3. Roses, dwarfs., 2; Stands. on Briars, 2. *Sequoia gigantea*, large specimen, 1.

DIVISION IV.—E. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN.
1881, FROM ESSEX, NORFOLK AND SUFFOLK.

ESSEX. *Rainfall*, .5 in. below av. of 15 yrs. (Dunmow). *Min.* rainfall, Manningtree (Lawford), 22.25 ins., on 148 days: max., Brentwood, alt., 270 ft.; ht., 1 ft.; 30.74 ins., on 112 days. *Min. temps.*, Saffron Walden; Jan. 22nd, -9° ; Do., alt., 182 ft.; Jan. 21st, 0° : Hatfield Peverel; Jan. 21st, 5° : Sheering, alt., 214 ft.; and Harlow, alt., 273 ft.; Jan. 17th, 9° .

Plants injured, 1880-81—19 (1), 25 (2), 18 (3), total at 4 places.

NORFOLK. Year began dry; early summer, very wet. Harvest weather brilliant; Nov., some sharp frosts; Dec., mild; Jan, 1881, 1st week fine, 12th to 26th unusually cold; on 18th a hurricane with heavy snow-fall; 27th, thaw (Diss): *Min. rainfall*, Geldeston, alt., 38 ft.; ht., 1 ft.; 24.17 ins.: max., Swaffham, alt., 242 ft.; ht., 1 ft. 10 ins.; 34.49 ins., on 171 days. *Min. temps.*, Costessy, alt., 40 ft.; Jan. 26th, 1° : Hillington, alt., 88 ft.; Jan. 26th, $1^{\circ}3'$: Geldeston, alt., 40 ft.; Jan. 26th, $3^{\circ}5'$: Hindringham, alt., 190 ft.; Jan. 25th, $8^{\circ}5'$: Yarmouth, alt., 10 ft.; Jan. 15th, 16th, 10° : Cromer, alt., 90 ft.; Jan. 17th, 12° .

Plants injured—1880-81—4 (1), 2 (2), total at 1 place.

SUFFOLK. Early months, dry; Aug., damp; nine heavy tempests (Ashbocking). First five months dry; *Rainfall* of yr. much above av. (Walsham-le-Willows); Jan. 1881, sharp frosts with piercing E. winds and drifting snow (1 ft. deep); winds clearing off all weak and dead limbs or twigs; Cedars much damaged (Hardecastle House, Jan. 1881). *Min.* rainfall, Ipswich, ht., 1 ft.; 22.23 ins., on 130 days: max., (Walsham-le-Willows), 29.33 ins., on 163 days. *Min. temps.*, Barton Hall and Culford, Jan. 25th, 1° : Thornham Hall, Jan. 26th, 2° : Bendlesham Hall, Jan. 26th, 4° : Somerleyton, alt., 50 ft.; Jan. 26th, $4^{\circ}9'$: Lowestoft, alt., 85 ft.; Jan. 15th, $9^{\circ}2'$.

Plants injured, 1880-81—6 (1), 23 (2), 11 (3), total at 3 places.

REPORTS.

1. ESSEX—CHELMSFORD, Hatfield Peverel.—Mr. H. W. Pitcher.

Gen. Char. of Soil—A heavy wet loam.

Alt. and Exposure—Low, sheltered by wood and park.

Rainfall, 1880—[Chelmsford, alt., 86 ft.; ht., 1 ft.; 27·21 ins., on 140 days].

Date of Onset and Duration of Frost—Onset, unknown; Dec. 22nd, 24°; frost continued without a break until Feb. 19th. Severest period from Jan. 7th, 26°; 13th, 12°; the following eight nights, 13°, 10°, 13°, 13°, 26°, 13°, 10°, 5°.

Min. Temp. and Date—Jan. 21st, 5°; therm., ht., 3 ft.. N. asp.

Plants injured, 1880-81—5 (1), 9 (2), 6 (3)—Arbutus Unedo, 2. Artichoke, globe, 2. Aucuba japonica, variegata, 2. Azalea indica, 3. Broccolis, in parts, 1. [See below]. Catalpa syringæfolia, large tree, 1. Cedrus Deodara, 3. Cherries, white, 2. Clematis Jackmanni, 2. Eucalyptus globulus, 1. Holly, variegated, 2. Laurel, Bay, 1. Laurel, common, 2. Laurustinus, 2. Liriodendron tulipifera, 1. Olearia Haastii, 1. Parsley, 3. Quercus Ilex, 3. Santolina chamæcyparis, 3. Tritoma uvaria, 2. Wallflowers, 3.

Observations—Broccolis—Penzance early white, Snow's winter white and many of Knight's protecting were killed. Sander's Goshen, Protecting, Model, Dilcock's Bride and Cattell's Eclipse withstood the winter well; nearly every plant furnishing a splendid head: a portion of these were grown in a good south border under a high wall. Walcheren and Veitch's self-protecting had been cleared before Christmas. Cherries ripen here in the middle of July. They are of a large sort and good flavour, but of unknown name. Since the severe winter last year, the branches on all the east side of the standard trees have been dying. The wall trees have not suffered in the least.

2. ILFORD.—Mr. W. Earley.

Gen. Char. of Soil—Stiff clay-like loam.

Alt. and Exposure—Table land.

Rainfall, 1880—[Leyton Obs., dist., 4 ms., W.; alt., 97 ft.; ht., 1 ft.; 29·89 ins.].

Min. Temps. and Dates—[Harlow, dist., 16 ms., N.; alt., 273 ft.; Jan. 15th, 17th, 9°: Greenwich, 6 ms., S.; alt., 155 ft.; Jan. 17th, 12°·7].

Plants injured, 1880-81—8 (1), 6 (2), 1 (3)—Apples, Wellington, 3. Arbutus Unedo, 1. Artichoke, globe, 3. Broccoli, Nicholson's and Purple sprouting, 2. Broom, 1. Laurel, common, 2. Nectarines, 2. Passiflora cœrulea, 1. Pampas grass, 1. Picea Pin-sapo, leaves, 2. Quercus Ilex, lost leaves, 2. Roses, Double Macartney, 1. Sequoia gigantea, 2. Tritoma uvaria, large stock, 1. Veronica Andersoni, 1. Wallflowers, three fourths, 1.

Plants uninjured—Ampelopsis Veitchii (much exposed), Berberis stolonifera, Deutzia scabra, fl. pl., Lonicera aureo-reticulata, Philadelphus Gordonii, Spiræa Lindleyana, survived in one of the most trying situations.

3. SAFFRON WALDEN.—Mr. R. M. Christy.

Rainfall, 1880—[(Newport), alt., 180 ft.; ht., 1 ft.; 28·04 ins., on 175 days].

Date of Onset and Duration of Frost—Jan. 10th, very sharp frosts on several nights, following the great snow-storm on 18th: 20th, 21st, -2°; 22nd, -9°; 27th, rapid thaw.

Min. Temp. and Date—Jan. 22nd, -9°.*

Plants injured, 1880-81—5 (1), 6 (2), 7 (3)—Araucaria imbricata, many, 1879-80, 2; 1. Aristolochia Siphon, 3. Aucuba japonica, 2. Box, 3. Coronilla glauca, 2. Holly, 3. Ivy, 2, 3. Jasminum officinale, 3. Laurel, Bay, 1, 2. Laurel, common, 1, 2; young shoots killed to ground particularly in damp places; L. Portugal, 2. Mulberry, 3. Rhododendrons, 3. Roses, Stands., 1; Tea, 1; Stocks, 1.

Plants uninjured—Ampelopsis hederacea, Asparagus, Berberis vulgaris, Celery, Currants, Cytisus Laburnum, Daphne Laureola, D. Mezereum, Euonymus europæus, Hyacinths, Jasminum nudiflorum, Lilac, Ruscus aculeatus.

Observations—Araucarias, many which were much injured last winter are killed now. Hawthorn, this bore but little blossom last year; but is now noticeable for its unusual abundance.

4. STANSTEAD, Elsenham Hall.—Mr. W. Plester.

Gen. Char. of Soil—Kitchen garden, a light sandy soil; shrubbery, a loam with chalk.

Alt. and Exposure—[Stanstead, alt., 240 ft.].

* Registered in the High St., by a perfectly new instrument, specially made to register low temps., and just tested at Kew.

Rainfall, 1880—[Stanstead, ht., 1 ft. ; 28·08 ins.].

Date of Onset and Duration of Frost—Jan. 6th until 27th.

Min. Temps. and Dates—Jan. 22nd, 4° : min. temp. in Feb., 22° ; min. temp. on March 29th and 30th, 21° ; min. temp. in April, 22°.

Plants injured, 1880-81—1 (1), 4 (2), 4 (3)—*Berberis Darwinii*, 2. Broccoli, 1. Brussels sprouts, 3. Cabbages, 3. Cauliflower, 2. *Garrya elliptica*, 3. Laurel, Bay, 2. *Laurustinus*, 2. *Leycesteria formosa*, 3.

1. SUFFOLK — BURY ST. EDMUND'S, Barton Hall. — Sir C. J. F. Bunbury, Bart.

Gen. Char. of Soil—Gravel and clay much mixed, with a large proportion of chalk rubble.

Alt. and Exposure—Considerably higher than Bury St. Edmund's. The arboretum is much sheltered by groves.

Rainfall, 1880—[Ht., 1 ft. ; 28·30 ins., on 183 days].

Min. Temps. and Dates—26th, 1° : Bury St. Eds., Bot. Gard., -4° : [Culford, Jan. 21st and 25th, 1°].

Plants injured, 1880-81—3 (1), 8 (2), 4 (3)—*Benthamia fragifera*, 2. *Chimonanthus fragrans*, 2. *Cupressus sempervirens*, 2. *Escallonia macrantha*, 1. *Euonymus japonicus*, 2. Furze, 3. *Hypericum Calycinum*, 3. Laurel, Bay, 1. Laurel, common, 2. *Laurustinus*, 2. *Magnolia grandiflora*, 1. *Paulownia imperialis*, 1 ? *Pinus pinea*, 3. *Quercus Ilex*, 2 ; *Q. Suber*, 3.

Plants uninjured—*Abies Douglasii*, *A. Morinda*, *Ampelopsis Veitchii*, *Arbutus Unedo*, *Aucuba japonica*, *Berberis vulgaris*, *Biota orientalis*, Box, *Cedrus Atlantica*, *C. Deodara*, *C. Libani*, *Cryptomeria japonica*, *Cytisus Laburnum*, *Daphne Laureola*, *D. Mezereum*, *Deutzia scabra*, *Euonymus europæus*, *Forsythia viridissima*, *Halesia tetraptera*, Holly, *Jasminum nudiflorum*, Larch, Portugal Laurel, Lilac, *Liquidambar styraciflua*, *Negundo fraxinifolia*, *Picea cephalonica*, *P. lasiocarpa*, *P. Nordmanniana*, *P. Pinsapo*, *Pinus excelsa*, *P. sylvestris*, Plane, *Pyrus japonica*, *Ruscus aculeatus*, *Salisburia*, *Sequoia sempervirens*, *Taxodium distichum*, Yew, Do. Irish.

2. EYE, Thornham Hall.—Mr. J. Perkins.

Gen. Char. of Soil—A strong loamy soil, resting on brick-earth.

Alt. and Exposure—100 ft. ; exposed to E. and W. winds.

Rainfall, 1880—25·75 ins.

Date of Onset and Duration of Frost—Oct. 24th, 25° with moderate frosts till Jan. 14th, 15°; very hard frosts prevailing till 26th.

Min. Temps. and Dates—Jan. 17th, 8°; 21st, 5°; 22nd, 3°; 26th, 2°.

Plants injured, 1880-81—1 (1), 5 (2), 7 (3)—*Abies Douglasii*, 3. Apricots, 3. *Aucuba japonica*, 3. Broccoli, 70 p. c., 1, all others, 2. *Cedrus Libani*, 3. Figs, 2. Laurel, Bay, 2. Laurel, common, 3. *Laurustinus*, 2. *Magnolia grandiflora*, Exmouth var., 2. Roses, Stands. on briars, 3. Wallflowers, 3.

Observations—Broccoli, had they been wholly taken up, then laid down and well earthed up, most of them might have been saved; as the stems become harder and more frost-resisting, though the heads do not grow so large.

3. EYE, Thornham Rectory.—Rev. C. Clarke.

Plants injured, 1880-81—2 (1), 12 (2), 1 (3)—Artichoke, globe, 2. *Aucubas*, 2. Broccolis and Cauliflowers, nearly all, 1. *Cedrus Deodara*, 2. *Cotoneaster*, 2. *Jasminum officinale*, 2; Do. yellow, 2. Laurel, Bay, 2. Laurel, common, 2; Do. Portugal, 3. *Lonicera*, French, 2. *Rhododendrons* (small), 2. Roses, fresh budded and those of 1879, 1, 2. *Sequoia gigantea*, 2.

1. NORFOLK—KING'S LYNN, Gaywood.—Mr. T. Williams.

Gen. Char. of Soil—Gravelly in part, with some yellow loam.

Alt. and Exposure—Low, flat and wet.

Rainfall, 1880—[Hillington Hall, dist., 4 ms.; alt., 93 ft.; ht., 1 ft.; 31·77 ins.].

Date of Onset and Duration of Frost—Jan. 11th; lasted six weeks.

Min. Temps. and Dates—From 14° to 16°: [Hillington, alt., 88 ft.; Jan. 26th, 1°].

Plants injured, 1880-81—4 (1), 2 (2)—Apples, 50 trees, 2. Laurel, Portugal, 100 trees, 2. *Laurustinus*, 10 trees, 1. Nectarines and Peaches, one-fifth, 1. Roses, one-half, 1. *Vegetables*, on an average about half a crop saved, but the quality not at all good.

DIVISION V.—S. W. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881,
FROM CORNWALL, DEVONSHIRE, DORSETSHIRE, SOMERSETSHIRE AND
WILTSHIRE.

CORNWALL. Driest year since 1870; *Rainfall*, 9 ins. below av. of 16 yrs.; Jan. and Aug., direst on record; Sept., hottest month; Oct., damaging floods about 5th; Jan. 1881, the coldest month on record; mean temp., $30^{\circ}2$; snow drift on 17th, varying in depth to 10 ft.; thaw on 27th (Altarnun). Min. rainfall, Penellick, alt., 240 ft.; ht., 9 ins.; $30\cdot98$ ins.: max., Launceston, alt., 470 ft.; ht., 4 ins.; $56\cdot62$ ins., on 187 days. *Min. temps.*, Altarnun, Jan. 26th, 3° : Bude, alt., 16 ft.; Jan. 22nd, $3^{\circ}7$: Bodmin, alt., 232 ft.; Jan. [26th ?]*, 12° : Truro, alt., 56 ft.; Jan. 15th, 12° : Penzance, alt., 67 ft.; Jan. 22nd, 21° : Falmouth, alt., 200 ft.; Jan. 22nd, $22^{\circ}8$. Scilly, temp. 32° on 3 days; 29° on 2 days (*Jl. of Hort.*).

Plants injured, 1880-81—18 (1), 5 (2), 4 (3), total at 1 place.

DEVONSHIRE. *Rainfall*, Jan. and Aug., least for 16 yrs.; Oct. 4th, $2\cdot17$ ins. fell; total, 7 p. c. below av. (Torquay). Jan. 1881, very cold, mean temp., $34^{\circ}6$, or 7° below av.; temp. below 32° , on 19 consecutive nights; snow every day from 16th to 21st (Babbacombe). Min. rainfall, Prawle Point, alt., 350 ft.; ht., 1 ft. 9 ins.; $27\cdot87$ ft., on 184 days: max., Princetown, alt., 1360 ft.; ht., 1 ft.; $75\cdot85$ ins., on 192 days. *Min. temps.*, Cullompton, alt., 202 ft.; Jan. 20th, $7^{\circ}1$: Barnstaple, alt., 43 ft.; Jan. 26th, 8° : Bridgetown, alt., 107 ft.; Jan. 23rd, $8^{\circ}8$: Dartmoor, alt., 1360 ft.; Jan. 25th, 10° : Brampford Speke, alt., 140 ft.; Jan. 16th, $10^{\circ}6$: Arlington, Jan. 15th and 26th, 11° : Teignmouth, alt., 235 ft.; Jan. 22nd, $11^{\circ}3$; alt., 50 ft.; $15^{\circ}7$: Prawle Pt., alt., 330 ft.; and Plymouth, alt., 69 ft.; Jan. 20th, 17° .

Plants injured, 1880-81 — 18 (1), 20 (2), 34 (3), total at 2 places.

* Jan. 6th, *Qr. Jl. of Met. Soc.* probably a misprint for 26th.

DORSET. Spring, dry (Langton Herring). *Rainfall*, 9·89 ins., fell in 1st half; 20·68 ins., in 2nd half of yr. (Wimborne). *Min. rainfall*, Portland, alt., 473 ft.; ht., 20 ft.; 24·68 ins., on 153 days: max., Beaminster, 41·48 ins., on 178 days. Jan. 1881, cold, intense, with deep snow; coldest day, 25th; max. temp., 20° (Langton Herring). *Min. temps.*, Tyneham House, Jan. 20th, -3° [too low?]: Swanage, dist., 9 ms., E.; alt., 178 ft.; Jan. 22nd, 12°·7: Langton Herring, alt., 200 ft.; Jan. 22nd, 12°·8.

Plants injured, 1880-81 — 59 (1), 51 (2), 50 (3), total at 3 places.

SOMERSET. *Rainfall*, Dec., 1 in. above av. of 15 yrs.; chiefly in 2nd half of month; fog at times (Bath). *Min. rainfall*, Glastonbury, alt., 60 ft.; ht., 21 ft. 8 ins.; 28·68 ins.: max., Exford, alt., 905 ft.; ht., 1 ft.; 59·29 ins., on 215 days. Obs. in winter, 1880-81, at Bath—Taking together the 3 months of Dec., Jan. and Feb., the mean temp. of the winter was 39°, or 2°·3 below av. of 15 yrs. Its great distinguishing feature as compared with the 2 previous winters was the entirely opposite character of Dec. and Jan. Dec. 1880 was very mild throughout; the mean temp. being 5° above the av. of 15 yrs., and more than 12° higher than that of Dec. 1879. The max. temp. rose to above 50° on 20 days, whilst the min. temp. was below 32° only on 6 nights; and these frosts were all very slight, except on 26th, viz. 29°. The mean temp. of Dec. was 42°·8. Jan. 1881 was very severe, the mean temp. being nearly 10° below av. of 15 yrs. Temp. was below 32°, at night, from 7th to 27th inclusive, and below 20° on 11 nights, twice being down nearly to 11°. Snow and sleet, representing rainfall, 2 ins. (but probably below the mark from drifting); the chief fall, on 18th and 19th when there was a continuous drifting snow for nearly 40 hours with a gale from E. and N.E. Northerly winds prevailed throughout the month. Feb. was cold, but not severe. Mean temp. being only 2° below av. *Min.*, at or below 32° ten times. *Max. temp.* for month, 53°; *min.*, 26°. Bath, Rev. L. Blomefield. *Min. temps.*, Mells., alt., 342 ft.; Jan. 14th, 3°: Bristol, alt., 200 ft.; Jan. 15th, 8°·5: Downside, alt., 592 ft.; Jan. 15th, 8°·8.

Plants injured, 1880-81—13 (1), 34 (2), 7 (3), total at 2 places.

WILTS. *Rainfall*, above av.; and land saturated (Steeple Ashton, Compton Bassett). *Min. rainfall*, Steeple Ashton, alt., 240 ft.; ht., 1 ft.; 28·21 ins., on 165 days: max., Warminster., alt., 450 ft.; ht.,

2 ft.; 37·32 ins. Jan. 1881, dry and frosty till 17th, then very stormy; immense snow drifts on 18th; gentle thaw on 27th. *Min. temps.*, Wilton, alt., 180 ft.; Jan. 22nd, 2°·5: Compton Bassett, alt., 400 ft.; Jan. 15th, 3°: Holt, alt., 120 ft.; Jan. 17th, 5°·5: Marlborough, alt., 472 ft.; Jan. 15th, 6°·9.

Plants injured, 1880-81 — 46 (1), 41 (2), 34 (3), total at 1 place.

REPORTS.

1. CORNWALL—PROBUS, Lamorran—Hon. and Rev. J. T. Boscawen.

Gen. Char. of Soil—Very cold, on a slate and clay subsoil in places.

Alt. and Exposure—120 ft., not exposed, the valley being shaped like a cup on S. side.

Rainfall, 1880 — [Truro, dist., 4 ms.; alt., 56 ft.; ht., 40 ft.; 38·09 ins., on 178 days].

Date of Onset and Duration of Frost—Jan. 8th, 27°; to 26th, 18°; and 27th, 31°. Great snow-fall on 18th, temp., 28° (Pentille Castle).

Min. Temps. and Dates—Jan. 15th, 13°; 21st, 12° (Pentille Castle).

Plants injured, 1880-81—18 (1), 5 (2), 4 (3)—*Arbutus procera*, 1; *A. Unedo*, 1. *Ceanothus americanus*, 1; *C. dentatus*, 1; *C. grandiflorus*, 1. *Cedrus Deodara*, 3; *C. Libani*, 3. *Cupressus torulosa*, 1. *Dracæna australis*, kd. to grd., 2. *Embothrium coccineum*, 1. *Escallonia*, in open, 1. *Eucalyptus globulus*, 1. *Euonymus europæus*, 1. *Fitzroya patagonica*, 1. *Fourcroya longæva*, 1. *Fuchsia coccinea*, kd. to grd., 2. *Gunnera scabra*, 1. *Hydrangea Hortensea*, 1, kd. to grd., 2. *Laurel*, Bay, 2, 3. *Laurel*, common, 3. *Laurustinus*, kd. to grd., 2. *Pittosporum Tobira*, 1. *Ruscus aculeatus*, 1. *Veronica salicifolia*, 1.

Plants uninjured—*Abies Douglasii*, *Ampelopsis Veitchii*, Apricots, *Aralia Sieboldii*, *Araucaria imbricata*, *Arbutus Andrachne*, *Globe Artichoke*, *Arundo conspicua*, *A. donax*, *Aucuba japonica*, *A. j. variegata*, *Azalea indica*, *Bambusa Fortunei*, *Benthamia fragifera* (large trees cut, one and a-half ms. distant), *Berberidopsis corallina*, *Ber-*

beris Darwinii, *B. japonica*, *B. vulgaris*, *Biota orientalis*, Broccoli, Brussels sprouts, Camellias, *Cedrus Atlantica*, *Chamærops Fortunei*, *Chimonanthus fragrans*, *Choisya ternata*, *Cistus ladaniferus*, *Clematis Jackmanni*, *C. montana*, *Cotoneaster microphylla*, *C. Simonsii*, *Cryptomeria elegans*, *C. japonica*, *Cupressus borealis*, *C. Lambertiana*, *C. Lawsoniana*, *C. macrocarpa*, *C. sempervirens*, *Desfontainea spinosa*, *Erica codonodes* (wood well ripened, kd. 10 yrs. ago), *Escallonia macrantha* (on wall), *Forsythia elegans*, *Gladiolus*, Hyacinths, *Jasminum nudiflorum*, *Kalmia latifolia*, Larch, Lilac, *Lilium auratum*, *L. lancifolium*, *Liquidambar styraciflua*, *Magnolia grandiflora*, Onions (winter), *Osmanthus aquifolius*, *O. ilicifolius*, Pampas grass, *Passiflora cœrulea*, *Paulownia imperialis*, *Phormium tenax variegatum*, *Pinus patula*, *Rhododendrons* (all except *P. arboreum*), *Rhus glabra*, Roses, *Sequoia gigantea*, *Skimmia japonica*, *Taxodium distichum*, *Tritoma uvaria*, *Wistaria sinensis*, *Yucca aloifolia*, *Y. filamentosa*, *Y. gloriosa*.

Observations—I have paid great attention for years to the extraordinary differences of temp. occurring in places. It is found that fields side by side and with the same aspect are widely different as to earliness. One may be of great value for early strawberries, the other useless for the early strawberry market. The soil at Lamorran is very "cold." There are, however, some "spits" in my garden much warmer than others. I have placed, on more than one occasion, 10 or 12 thermometers about my garden in different places and I found as many as 10 degrees difference; in fact in one place, one mile distant, there was no frost, in another 6, 9 or 10 degrees; again a lake near was frozen, while at an elevation of 80 ft. the ground was worked easily and vegetables planted. The deep valleys in Cornwall are intensely cold even near the sea. The temperature has been 0° twice in the same winter: and I have known at the end of May the Oaks in the valleys to have their leaves quite black and nearly killed. I have had 2 degrees of frost on 22nd or 23rd of July. This shows how little one can tell about hardiness of plants in different localities. Thus on one occasion I found all my *Rhododendrons* cut to pieces in one place; but other specimens and Camellias elsewhere were untouched. Hydrangeas and *Laurustinus*, however, are killed about every third year, wherever they may be planted. I attribute this to the warm weather in Nov., or Jan., exciting them to grow, and consequently the sap being in the vessels they burst.

This happened to half a dozen or more specimens of *Pinus insignis* at different elevations, but chiefly half way up a hill side and not in the valley. The bark was burst nearly all round the branches in some places and half round in others. *Pinus religiosa* stood well with me for years, but was quite killed in 1880-81.

1. DEVON—EXETER, Halden House.—Mr. Geeson.

Gen. Char. of Soil—A deep rich loam on sandstone.

Alt. and Exposure—500 ft. ; exposed from S.W. to N.W.

Rainfall, 1880—[Exeter, dist., 5 ? ms., N. ; alt., 155 ft. ; ht., 13 ft. 7 ins. ; 33·26 ins., on 135 days].

Date of Onset and Duration of Frost—Jan. 7th, 28°, till 26th, 12°. On 18th and 19th, thirteen inches of snow fell.

Min. Temp. and Date—Jan. 22nd and 26th, 12°.

Plants injured, 1880-81—3 (1), 6 (2), 10 (3)—*Aralia Sieboldii*, variegata, planted 1879, 3 ; Do. planted several years, 1. Broccoli, Veitch's self-protecting and spring white, 2. Celery, 3. *Clianthus puniceus*, in plunged pots, 2. *Dracaena australis*, 2. *Escallonia montevidensis*, 2. *Eucalyptus globulus*, 1. *Gladiolus*, planted shallow, 1. *Gunnera scabra*, 2. Laurel, common, 3. *Laurustinus*, 3. Myrtles, fl. pl., 3. *Phormium tenax*, 2. *Ranunculus*, various, planted in Oct., 2. Rhododendrons, early flowers, kd., 3. Roses, on Manetti and own roots, 3. *Veronica Traversi*, 3. Wallflowers, 3.

Plant uninjured—*Bletia hyacinthina*.

2. TORQUAY, Babbacome.—E. E. Glyde, Esq., F.M.C.

Gen. Char. of Soil—Clay and limestone.

Alt. and Exposure—294 ft. ; facing S., but exposed to S.W. and N.E. winds.

Rainfall, 1880—37·52 ins., on 179 days.

Date of Onset and Duration of Frost—Excessively cold from Jan. 15th to 22nd. Temp. fell below 32° on nineteen consecutive nights (Jan. 8th to 26th), and below 20° on seven nights. Temp. was altogether below 32° on twenty-six nights in July, the lowest being 6°·5 on the 15th. Snow fell every day from Jan. 16th to 21st, very heavily on the 18th, when it was about 7 ins. deeper than av., but was drifted by gales on that and the next day, and again on the 21st to the depth of several feet. It lay on the ground from the 11th to the 27th, and in the drifts till Feb. 5th. The beginning of March was also very severe,

the air temp. falling to 22°·0 on the 1st, and to 21°·3 on the 2nd (and on the grass to 12°·7). 3 inches of snow fell on Feb. 27th, remaining on the ground till March 3rd. The frost did not penetrate as deep as 6 inches below the grass surface of the lawn all the winter; the lowest observed at 9 a. m. or 9 p. m., being 33°·4 at 9 a. m. on Jan. 22nd and 26th. At 1 ft. below the surface the lowest temp. was 34°·8, on Jan. 25th, 26th and 27th.

Plants injured, 1880-81—15 (1), 14 (2), 24 (3)—*Berberis Darwinii*, 3. *Biota orientalis*, 3. *Cupressus Lawsoniana*, 3; *C. macrocarpa*, 2. *Escallonia macrantha*, 2. *Euonymus europæus*, 3; *E. radicans*, 3. Holly, 3. Ivy, 3. Laurel, common, 2. *Laurustinus*, 1, 2. Myrtle, 1. *Quercus Ilex*, 3. *Veronica Andersoni*, 1. (*Babacombe*, much exposed to N.E. winds).—*Araucaria imbricata*, 3. *Arbutus Unedo*, 3. *Benthamia fragifera*, 2. Broccoli, most sorts, 1. Brussels sprouts, 3. *Ceanothus americanus*, 2; *C. azureus*, 2; *C. dentatus*, 2; *C. grandiflorus*, 2. *Chamærops Fortunei*, 3. *Cistus ladaniferus*, 3. *Clanthus puniceus*, 1. *Coronilla glauca*, 3. *Draecæna australis*, 2. *Eriobytrya japonica*, 3. *Escallonia montevidensis*, 1. *Eucalyptus globulus*, 1. *Euonymus japonicus*, 3. *Fabiana imbricata*, 1. *Genista racemosa*, 1. *Grevillea rosmarinifolia*, 1. *Griselinia littoralis*, 3. Laurel, Bay, 2. Lettuce, most sorts, 1. *Leycesteria formosa*, 2. *Magnolia grandiflora*, 3. Onions, winter, 1. *Passiflora cœrulea*, 3. *Phillyrea angustifolia*, 3. *Pinus insignis*, 3. *Pittosporum Tobira*, 1. Stocks, 2. *Veronica salicifolia*, 1; *V. Traversi*, 1. *Yucca filamentosa*, 3. (Torquay, much sheltered from N.E. winds).

Observations—The majority of the plants in the list forwarded grow at Torquay and were uninjured. *Choisya ternata* and *Olearia Haastii*, unexpectedly survived at Torquay. The greater part of the mischief to vegetation was done by the frosts and gales of January 1881; but much additional injury was caused by the heavy Easterly gales at the beginning of April.

1. DORSET—BEAMINSTER, Parnham House.—Mr. J. Mullins.

Gen. Char. of Soil—A sandy loam on limestone.

Alt. and Exposure—About 300 to 400 ft.

Rainfall, 1880—41·48 ins.

Date of Onset and Duration of Frost—Jan. 12th to 26th.

Min. Temp. and Date—Jan. 21st, 3°.

Plants injured, 1880-81—15 (1), 19 (2), 10 (3)—*Aloysia citrodora*, 1. *Aponogeton*, nr. surface of the water, 1. Apricots, 2. *Arbutus Unedo*, 2. Artichoke, globe, 2. *Arundo conspicua*, 1. *Asparagus*, 2. *Bambusa Fortunei*, 2. *Berberis Darwinii*, 3; *B. japonica*, 1. Broccoli, Adam's early, 1; Carter's Champion, 2; Cattell's Eclipse, 2; Chapel's Cream, 2; Early Penzance, 1; Early Purple, 1; Knight's Protecting, 2; Snow's Winter White, 1; of these marked (2) but a few only were saved. *Buddleia globosa*, 1; *B. Lindleyana*, 1. Camellias, 3. *Clematis montana*, 1. *Colletia cruciata*, 2; *C. ferox*, 1. *Coronilla glauca*, 3. *Cupressus Knightiana*, 1. *Dracaena australis*, 2. Endive, Batavian and Hardy Paris green, 1. *Euonymus japonicus*, 2; *E. radicans*, 2. *Fuchsia gracilis*, 15 yrs. old; and *F. Riccartoni*, 30 yrs. old, both kd. to grd., 2. *Genista racemosa*, 1. *Gunnera scabra*, 2. *Holboellia latifolia*, 2. *Kalmia latifolia*, 3. Laurel, Bay, 3. Laurel, common, 2 ft. of tops of high trees kd., 2. *Laurustinus*, 2. Lettuce, Hammersmith, hardy green-ribbed, in open, 1. *Leycesteria formosa*, 3. Myrtle, 3. Pampas grass, 3. *Passiflora cœrulea*, 1. *Phormium tenax*, 2. *Pittosporum Tobira*, 2. *Raphiolepis ovata*, 1. *Rhododendron arboreum*, hyb., 2. Roses, H. P.'s, 1. Sea-kale, unprotected, 1. Stocks, 1. *Veronica Andersoni*, 3; *V. salicifolia*, 3. Wallflowers, 1. *Yucca aloifolia*, 2.

Plants uninjured—*Aponogeton distachyon*, below the surface, *Magnolia conspicua*, fl. buds kd., 1879-80, blossomed well, 1881.

2. WAREHAM, Tyneham.—Th. Bond, Esq.

Gen. Char. of Soil—Mostly a stiff cold clay.

Alt. and Exposure—Much exposed to S. winds and sea fogs; one mile from the sea.

Rainfall, 1880—[Poole, dist., 10 ms., N.E.; alt., 6 ft.; ht., 1 ft. 1 in.; 35·19 ins., on 126 days].

Min. Temps. and Dates—Jan. 20th, -1° [too low? : Swanage, dist., 8 ms., E.; alt., 178 ft.; Jan. 22nd, $12^{\circ}7$: Langton Herring, dist., 15 ms., W.; alt., 200 ft.; Jan. 22nd, $12^{\circ}8$].

Plants injured, 1880-81 — 8 (2), 6 (3) — *Ampelopsis Veitchii*, 3. Artichoke, globe, 3. Broccoli, Adam's Early White and Penzance, one-half, 1. *Eucalyptus globulus*, 2. *Eugenia Ugni*, 3. Figs, 2. *Fuchsia Riccartoni*, 2. Furze, 3. Holly, 2. *Hypericum Wallichianum*, 2. Ivy, variegated, 3. *Jasminum officinale*, 2. Laurel, Bay, 2. *Laurustinus*, 2. Lettuce, Brown Cos, nearly all, 1. *Mandevilla suaveolens*, on S. wall, 2. Myrtle, 2. Pampas grass, 2. Rosemary,

3. Strawberries, Dr. Hogg and Carolina, 2.

Plants uninjured—Broccolis, Adam's Early White (one-half), Leamington, Penzance (one-half), Veitch's Welcome, Strawberries, Vicomtesse Héricart de Thury, President, Sir Charles Napier, Eleanor and Rivers' Eliza stood the winter well.

3. WIMBORNE MINSTER, Canford.—Mr. W. Hinds.

Gen. Char. of Soil.—Light with chalk on a gravelly subsoil. Herbaceous garden well and naturally drained.

Alt. and Exposure—Lying low and well sheltered.

Rainfall, 1880—[Chalbury, alt., 338 ft.; ht., 2 ft.; 30·57 ins., on 154 days].

Date of Onset and Duration of Frost—[Cold intense and snow deep (Langton Herring, dist., 25 ms., S.W.)]. The action of the frost itself and the piercing E. winds which accompanied it during part of the month of Jan., had a very disastrous effect upon all tender vegetation; and had it not been for the fine summer and autumn of 1880, the mortality among all kinds of trees and plants would have been vastly more. As it is many deaths have occurred during the past two months through the deadly effect of the parching winds which seem to have sapped all vitality out of plants and shrubs that were crippled by the frost.

Min. Temps. and Dates—Jan. 23rd, 2° [Bournemouth, dist., 5 ms., S.E.; alt., 134 ft.; Jan. 22nd, 11°·2].

Plants injured, 1880-81—44 (1), 24 (2), 34 (3)—Adonis vernalis, 1. Alstroemeria, 1. Anchusa italica, 1. Anemone japonica, 1; A. Pulsatilla, 1. Apples, 3. Apricots, 2. Armeria, Plantaginifolia, 1. Artichoke, globe, 3. Arundo conspicua, 2. Asparagus, 2. Benthamia fragifera, 1, 2, Berberis Darwinii, 2, 3. Borecole, 1. Broccoli, 1. Brussels sprouts, 1. Cabbages, 2. Calandrina umbellata, 1. Camellias, 3. Ceanothus americanus, 3. Chimonanthus fragrans, 3. Chrysanthemums, sum. flowering, 1. Clianthus puniceus, 1. Cotonaster microphylla, 3. Crataegus oxyacantha, fl. pl., 3. Cryptomeria elegans, 3. Cyclamen, several vars. of hardy sorts, 1. Daphne collina, 3. Deutzia scabra, 3. Dracæna australis, 2. Endive, 1. Epimedium pulchellum, 1. Erica, 3. Escallonia Ingrami, 2. Euonymus europæus, 2. Fabiana imbricata, 2. Furze, 3. Galax aphylla, 1. Garrya elliptica, 3. Gentiana acaulis, 1; G. verna, 1. Gooseberries, 3. Habrothamnus, 2. Hesperis matronalis, fl. pl. alba, 1. Holly, variegated, 3. Hydrangea arborescens, 3. Iberis

cordifolia, 1. *Kalmia latifolia*, 2. Laurel, Bay, kd. to grd., 2. Laurel, common, 3; *L. Portugal*, 2. *Laurustinus*, 2. Lavander, 2. Lettuce, 1. *Leycesteria formosa*, 2. *Lobelia cardinalis*, 1; *L. syphilitica*, 1. *Lythrum alatum*, 1. *Magnolia grandiflora*, 3. *Mimulus cardinalis*, 1. *Myosotis azurica*, 1. *Narcissus*, many, 1. *Osmanthus aquifolius*, 3; *O. ilicifolius*, 3. Pampas grass, 2. Parsley, 3. Penstemons, 3. *Phormium tenax*, 1. *Picea lasiocarpa*, 3. *Pinus insignis*, 3. *Primula amæna*, 1; *P. cashmeriana*, 1; *P. cortusoides*, 1; *P. denticulata*, 1; *P. japonica*, 1; *P. rosea*, 1. *Pyrus japonica*, 3. *Quercus glabra*, 3. Quince, 3. *Rhododendrons*, 2, 3. *Rodgersia podophylla*, 1. Roses, dwfs., 3; *H. P.'s*, 3; stands., 2; Tea, 2. *Rudbeckia purpurea*, 1. *Scilla campanulata*, *atrocærulea*, 1. *Sedum spectabile*, 1, 2. *Sidalcea malvæflora*, 1. *Skimmia japonica*, 3. *Spiræa palmata*, 1. Strawberries, 2. *Taxodium distichum*, 3. *Trillium grandiflorum*, 1. *Tritoma uvaria*, 3. *Valeriana rubra*, 1. *Veronica Andersoni*, 1.

Observations—Conifers have suffered little if at all here, with the exception of *Picea lasiocarpa* and *Pinus insignis*, which have rather a scorched appearance, but they are not permanently injured. *Berberis Darwinii*, *Portugal Laurels* in exposed places, and Hybrid *Rhododendrons* have sustained more or less injury according to their state of health, recent removal and exposure; but taken as a whole the losses among trees and shrubs are comparatively small. Roses were so well protected that the losses are hardly worth recording; Teas upon *Manetti* suffering most. Vegetables, every thing green was cut to the ground, excepting Spinach. After the thaw set in, Broccolis, Brussels sprouts &c. melted away into a putrid mass; even the stump of what is said to be the hardiest variety of Brussels sprouts rotted away as if boiled.

1. SOMERSET—BATH, Belmont.—Rev. L. Blomefield.

Alt.—[Queen's Parade, 100 ft.].

Rainfall, 1880—[Do., ht., 1 ft.; 32·59 ins., on 183 days].

Date of Onset and Duration of Frost—[See Met. Obs., p. 236].

Min. Temps. and Dates—[Jan. 14th or 15th?], nearly 11°: [Downside, dist., 14 ms., S.W. ?; alt., 592 ft.; Jan. 15th, 8°·8].

Plants injured, 1880-81—*Bignonia radicans*, 2. *Escallonia macrantha*, 2. Laurel, Bay, 2. Myrtle, 2.

Observations—The first three were kd. to grd. but are shooting

again from the base. The Myrtle was a large and healthy plant, well protected against a wall. The covering, moreover, was torn away by the furious gale and snow-drift on 18th. It is now recovering, and putting out shoots from the base (June 17th, 1881).

2. FROME, Mells Rectory.—Mr. T. Tickle.

Gen. Char. of Soil—Red loam, over Magnesian conglomerate. Coal-measure (?) clay in the park in some places.

Rainfall, 1880—39·9 ins.

Date of Onset and Duration of Frost—Jan. 6th to 26th.

Min. Temps. and Dates—Jan. 14th, 3°; therm., 4 ft.; -4°, on grass.

Plants injured, 1880-81—13 (1), 30 (2), 7 (3)—*Aloysia citriodora*, 2. *Araucaria imbricata*, 3. *Arbutus Unedo*, 1. *Artichoke*, globe, 2. *Arundo conspicua*, 1. *Aucuba japonica*, 2; *Do. variegata*, 2. *Berberis Darwinii*, 2. *Broccoli*, 1. *Brussels sprouts*, 2. *Bupleurum fruticosum*, 3. *Ceanothus azureus*, 2. *Cedrus Deodara*, 2. *Coronilla glauca*, 3. *Cupressus macrocarpa*, 2. *Daphne Mezereum*, 2. *Deutzia scabra*, 3. *Eriobotrya japonica*, 1. *Escallonia Ingrami*, 2; *E. macrantha*, 2. *Euonymus europæus*, 2; *E. japonicus*, 2. *Forsythia viridissima*, 2. *Fuchsia coccinea*, 1; *F. Riccartoni*, 2. *Garrya elliptica*, 2. *Gladiolus*, 1. *Halesia tetraptera*, 2. *Hydrangea japonica*, 2. *Ivy*, 2; *Do. variegated*, 2. *Jasminum nudiflorum*, 2; *J. officinale*, 2. *Laurel*, Bay, 2. *Laurel*, common, 2; *Do. Portugal*, 2. *Laurustinus*, 1. *Leycesteria formosa*, 1. *Ligustrum vulgare*, 2. *Paliurus aculeatus*, 2. *Pampas grass*, 1. *Penstemons*, 1. *Phillyrea angustifolia*, 2. *Phormium tenax*, 1. *Photinia serulata*, 2. *Quercus Ilex*, 2. *Rosemary*, 3. *Ruscus aculeatus*, 3. *Sequoia gigantea*, 3. *Spartium junceum*, 2. *Stocks*, 1. *Tritoma uvaria*, 2. *Veronica Andersoni*, 1; *V. Traversi*, 1.

1. WILTS—MARLBOROUGH, Mildenhall.—Rev. C. Soames.

Alt. and Exposure—56 ft. above river.

Rainfall, 1880—[Marlborough, dist., 2 ms.; alt., 472 ft.; ht., 1 ft. 2 ins.; 33·24 ins., on 181 days].

Min. Temps. and Dates—[Marlborough, alt., 471 ft.; Jan. 15th, 60·9: Compton Bassett, dist., 11 ms., W.; alt., 400 ft.; Jan. 15th, 16th, 3°].

Plants injured, 1880-81—6 (1), 5 (2), 4 (3)—*Arbutus Andrachne*, 3. *Cabbages*, 1. *Camellias*, some, 2. *Celery*, 1. *Figs*, 1.

Furze, 2. *Garrya elliptica*, 3. Laurel, Bay, 1, 2. Laurel, common, 2; Do. Portugal, 1. *Laurustinus*, 1, 2. *Quercus Ilex*, 3. Roses, stands., 3.

Observations—We have suffered less injury than might have been expected; as it has been only necessary to cut down some half-dozen shrubs of different sorts, one or two of which do not show signs of shooting again.

2. MARLBOROUGH, The Green.—Rev. T. Preston.

Gen. Char. of Soil—On chalk.

Alt. and Exposure—472 ft.; exposed to S.

Rainfall, 1880—33·24 ft.

Date of Onset and Duration of Frost—Temp. below 32° twenty-two times; below 20° twelve times; below 10° ten times.

Min. Temp. and Date—Jan. 15th, 6°·9.

Plants injured, 1880-81—16 (1), 15 (2), 5 (3)—*Ampelopsis* *hederacea*, 3; *A. Veitchii*, 3. *Biota orientalis*, 1. Broccoli, 1. Brussels sprouts, 1. Cabbages, 1. Cauliflower, 1. Celery, 1. *Daphne Laureola* (1879-80), 2; *D. Mezereum*, 2. *Escallonia macrantha*, 2. *Eucalyptus globulus* (1879-80), 1. *Euonymus japonicus*, 1, 2. Figs (1879-80), 1. Furze, 2. *Garrya elliptica*, 1. Kale, 1. Laurel, Bay, 2. Laurel, common, 2. *Laurustinus* (1879-80-81), 2. Lavander, (1879-80), 1, (81), 2. Lettuce, 1. *Leycesteria formosa*, 2. *Lonicera japonica*, 3. *Magnolia grandiflora*, 2. Mulberry, 3. Onions (winter), 1. Parsley (1879-80), 1, [1880-81, uninjured]. Roses, dwfs., H. P.'s, stands., and Teas, all, 2; Banksian, 1. *Santolina chamaecypariss*, 2. *Skimmia japonica*, (1879-80), 2. Wallflowers, 2. Yew, 3.

Plants uninjured—Apples, Apricots, *Araucaria imbricata*, *Aristolochia Sipho*, Asparagus, *Aucuba japonica variegata*, Box, *Cistus ladaniferus*, *Cotoneaster microphylla*, *Crataegus oxyacantha*, fl. pl., Currants, *Cytisus Laburnum*, *C. scoparius*, Elm, *Forsythia viridissima*, Gooseberries, Holly, *Hypericum Calycinum*, Iris, Ivy, *Jasminum nudiflorum*, Juniperus, Larch, *Ligustrum lucidum*, Lilac, Oak, Parsley, *Pyrus japonica*, Rhododendrons, *Ribes aureum*, *R. rubrum*, *Ruscus aculeatus*, Salisburia, Strawberries, *Weigela rosea*, *Wistaria sinensis*.

3. WARMINSTER, Longleat.*—Mr. G. Berry.

* From *The Garden*, June 4th, 1881, p. 567.

Rainfall, 1880—[Warminster, dist., 3 ms.; alt., 450 ft.; ht., 2 ft.; 37·32 ins.].

Min. Temps. and Dates—[Holt, dist., 12 ms., N.; alt., 120 ft.; Jan. 17th, 5°·5].

Plants injured, 1880-81—24 (1), 21 (2), 15 (3)—*Arbutus*, 1, 2, 3. *Aralia japonica*, 1. *Arundo conspicua*, many, 1. *Azara microphylla*, 1. Box, old, trained plants, by lake and exposed to winds, 2. *Buddleia globosa*, 1. *Bupleurum fruticosum*, 1. *Catalpa seringæfolia*, 1879-80, 2; 1. *Ceanothus*, all sorts, 2, 3. *Conifers*—*Araucaria imbricata*, 1. *Arthrotaxus laxifolia*, 2, 3. *Biota elegantissima*, 2, 3; *B. semper-aurescens*, 2, 3. *Cryptomeria elegans*, scarcely, 3. *Dacrydium Franklini*, 2, 3. *Fitzroya patagonica*, 2, 3. *Podocarpus andina*, 1. *Retinospora decussata*, 1, 2. *Taxodium sempervirens*, *alba spica*, 2, 3. *Thuja Vervæneana*, 2, 3. *Widdringtonia cupressoides*, 2, 3.—*Escallonia Ingrami*, cut back, 2; *E. macrantha*, cut back, 2. *Euonymus japonicus*, green and vars., 1. Furze, fl. pl., 1. *Griselinia littoralis*, fine bushes, in open, 1. *Hydrangea paniculata*, 1. *Idesia*, 1. *Indigofera Dosua*, 1. Ivy, on walls, cut by wind, 2. *Jasminum*, sorts, 2, 3. Laurel, common, old bushes, kd. to grd., 2; elsewhere, shrubs, 40 ft. high, free from draught and damp, 3; L. Portugal, 3. *Laurustinus*, in damp places, exposed to cutting winds, a few cut back, 2. *Leycesteria formosa*, in low places, kd. to grd., 2; higher ground, 3. *Menziesia polifolia*, 1. *Olea ilicifolia*, 1. Pampas grass, many, 1. *Photinia serrulata*, 1. Poplar, Lombardy, many, 1. *Raphiolepis ovata*, 1. Roses, young wood, cut, 2. *Stauntonia*, 13 yrs. old, 1. *Viburnum Awafurki*, 1. *Xanthoceras sorbifolia*, 2.

Observations—*Deciduous* forest and ornamental trees have not suffered much, as a rule, with the exception of Lombardy Poplars, many fine specimens being quite dead, and others are pitiable objects, fine trees that have adorned the landscape for nearly a century, some of them from 80 ft. to 100 ft. high. *Flowering* trees and shrubs never presented so beautiful a sight. Thorns (white, pink and scarlet), Bird Cherries, Laburnum, Lilacs, Brooms, Azaleas, Pyrus, and Barberries, each tree and shrub seems weighed down with clouds of bloom (June 4th, 1880).

DIVISION VI.—W. MIDLAND COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN.

1881, FROM GLOUCESTERSHIRE, HEREFORDSHIRE, SHROPSHIRE,
STAFFORDSHIRE AND WARWICKSHIRE.

GLOUCESTER. *Rainfall*, excessive for the 7th year (Clifton). Min. rainfall, Berkeley, alt., 60 ft.; ht., 8 ft.; 30·09 ins., on 143 days: max., Nailsworth, alt., 160 ? ft.; ht., 2 ft.; 40·01 ins., on 173 days. Jan. 1881, mild and damp at beginning and end; but exceptionally cold in the middle, with a terrible gale and snow drift on 18th (Cheltenham). Min. temps., Cheltenham, alt., 184 ft.; Jan. 20th, -3°·3: Cirencester, Jan. 22nd, -0°·3.

Plants injured, 1880-81 — 141 (1), 164 (2), 102 (3), total at 11 places.

HEREFORD. Wind frequently E. until Dec.; No. of wet days less than usual and temp. higher than 1879 (Bryngwyn). Year, devoid of sunshine (Hereford). *Min. rainfall*, Hereford, alt., 200 ? ft.; ht., 1 ft.; 28·91 ins., on 156 days: max., Longtown Vic.; 42·32 ins. Jan. 1881, frost from 6th to 27th; mean temp., 22°·5 (Ross). *Min. temps.*, Hereford, Richmond Place, -2°: Bryngwyn, alt., 420 ft.; Jan. 14th, 0°: Burghill, alt., 275 ft.; Jan. 15th, 1°·1. Ross, alt., 213 ft.; Jan. 21st, 2°·9: Fownhope, alt., 192 ft.; Jan. 21st, 22nd, 4°: Canon Frome, alt., 175 ft.; Jan. 22nd, 4°.

Plants injured, 1880-81—41 (1), 62 (2), 34 (3), total at 3 places.

SHROPSHIRE. June, July, very wet (Preen). *Min. rainfall*, Coalbrookdale, 28·65 ins.: max., Whitechurch, 41·27 ins., on 124 days. *Min. temps.*, Attingham, Jan. 16th, -5°: Churchstoke, alt., 549 ft.; Jan. 26th, -1°: Stokesay, alt., 374 ft.; Jan. 21st, -0°·9: Leaton, alt., 266 ft.; Jan. 16th, 1°: Sansaw, alt., 310 ft.; Jan. 15th, 8°.

Plants injured, 1880-81 — 23 (1), 26 (2), 16 (3), total at 2 places.

STAFFORD. Very disastrous year. *Rainfall*, greatest during hay and corn harvest (Tamworth). Min. rainfall, Alrewas, 28·70 ins.:

max., Alstonfield, alt., 910 ft.; ht., 1 ft.; 44·71 ins., on 148 days. Jan. 1881, frost during the month; with temp. below 32° for 3 weeks (Abney Hall).

WARWICK. *Rainfall*, 36·68 ins., or 13·5 ins., above av., viz., 23 ins. (Rugby). Weather dry to July: July, Sept. and Oct., very wet (Coventry). Min. rainfall, Stratford-on-Avon, alt., 123 ft.; ht., 8 ins.; 29·75 ins.: max., Rugby, alt., 383 ft.; ht., 1 ft. 3 ins.; 36·68 ins., on 167 days. *Min. temps.*, Jan. 1881, Stockton, Jan. 21st, 3°: Warwick, Jan. 20th, and Charlcote 21st, 4°.

Plants injured, 1880-81—60 (1), 72 (2), 39 (3), total at 3 places.

REPORTS.

1. GLOUCESTERSHIRE — BERKELEY, The Chantry. — Rev. J. L. Stackhouse.

Rainfall, 1880—[Berkeley (Salter St.), alt., 60 ft.; ht., 8 ft.; 30·09 ins., on 143 days].

Plants injured, 1880-81 — 5 (1), 12 (2), 10 (3)—*Ampelopsis Veitchii*, 3. *Arbutus Unedo*, 3. *Aucuba japonica*, variegata, 2. *Bambusa Fortunei*, 2. *Borecole*, 1. *Broccoli*, 1. *Brussels sprouts*, 1. *Cabbages*, 1. *Ceanothus azureus*, 3. *Chimonanthus fragrans*, 3. *Daphne Laureola*, 3. *Dicentra spectabilis*, 3. *Escallonia macrantha*, 2. *Figs*, 2. *Kale*, 2. *Laurel*, Bay, 2. *Laurel*, common, 2; Do. Portugal, 2. *Laurustinus*, 2. *Lilium lancifolium*, 3. *Magnolia grandiflora*, 3. *Myrtles*, 1. *Pampas grass* (scarcely survived last 2 winters), 2. *Passiflora cœrulea*, 2. *Phormium tenax* (suffered much more in 1879-80, quite kd. to grd.), 3. *Quercus Ilex*, 2. *Seaforthia elegans*, much injured by previous autumns, always removed into the house for the winter, lost its beauty in 1879. *Wallflowers*, 3.

Plants uninjured—Almond, Apricots, Asparagus (better than for two years), Box, Carnations, *Cistus ladaniferus*, *Clematis Jackmanni*, *C. montana*, *Cratægus Pyracantha*, *Crinum Capense*, Currants, *Cytisus Laburnum*, *erica carnea*, *Euonymus radicans*, Gooseberries, Holly, Do. variegated, Hyacinths, *Hydrangea japonica*, *Hypericum Calycinum*, Ivy, *Jasminum nudiflorum*, Lilac, *Lonicera japonica*, Nectarines, Onions (winter), Parsley, stood the winter better than usual,

Peaches, Pears, Plums, Privet, *Pyrus japonica*, *Ribes sanguineum*, *Sequoia gigantea*, *Soldanella alpina*, *Tritoma uvaria*, *Weigela rosea*, *Wistaria sinensis*, *Yucca aloifolia*.

2. CHELTENHAM, Battledown.—Sir Brooke Kay, Bart.

Gen. Char. of Soil—A stiff clay, about 20 ft., above Lias clay.

Alt. and Exposure—390 ft. ; ground sloping to N.W., and very open to all Northerly winds.

Date of Onset and Duration of Frost—[Frost severe, Jan. 14th to 18th, 10°; and from 20th to 26th].

Min. Temp. and Date—[Alt., 184 ft. ; Jan. 20th, -3°·3].

Plants injured, 1880-81—6 (1), 1 (2), 6 (3)—*Aucuba japonica*, 3. *Berberis Darwinii*, moved in aut., 1, 2. *Cistus*, gum, 1. Fig, large and fine tree, 1 (?). Laurel, Bay, 1, 2. Laurel, common, 3 ; Do. Portugal, 3. *Laurustinus*, 3. *Raphiolepis ovata*, 3. *Picea Pinsapo*, lost foliage, making long healthy shoots, 3. Roses, *Maréchal Niel*, &c., a few, 1. *Tritoma*, 1.

Plants uninjured—Hyacinths blossomed splendidly but bulbs were found to have rotted. Lilies do not succeed here, but were none the worse. Pines and Rhododendrons do not flourish here ; none, hurt.

Observations—In my opinion the cold winds and dry weather of spring have completed the damage done in the past winter. The injuries would not have been half so great had it been succeeded by a milder and damper spring. Many Roses and other things that were just touched by the frost have since died (May 27th, 1881).

3. CIRENCESTER, Nurseries.—Messrs. Jeffries and Sons.

Min. Temps. and Dates—Several successive nights, 0°, and occasionally below 0°.

Plants injured, 1880-81—8 (1), 12 (2)—*Abies polita*, 2. *Ailanthus glandulosa*, 2. *Arbutus*, 1. *Aucubas*, of sorts, 2. *Berberis Darwinii*, 2. *Biota Mildensis*, 2. *Catalpas*, 1. *Cedrus Deodara*, 2. *Cotoneasters*, 2. *Escallonias*, 1. Furze, fl. pl., 2. *Garrya elliptica*, 1. Hollies, 2. Laurel, Bay, 1. Laurel, common, of sorts, 2 (Caucasian stand better than any other vars., even than the Colchican, hitherto considered the hardiest) ; L. Portugal, 2. *Laurustinus*, 1. *Phillyreas*, 1. *Pinus insignis*, 1. *Taxodium sempervirens*, 2.

Plants uninjured—Trees introduced from Japan have generally stood well. *Abies Englemanni*, *Cryptomeria japonica*, *Cupressus Lawsoniana*, and vars., *Juniperus aurea*, *J. chinensis aurea*, *J. japonica aurea*, *Picea lasiocarpa*, *P. nobilis*, *P. Nordmanniana*, *Pinus*

devoniana (magnifica), *P. Parryana*, *Retinosporas*. (In Mr. D. Darby's Nurseries)—*Abies canadensis*, *Aucuba japonica*, *Berberis dulcis*, Box tree, *Cotoneaster microphylla*, *Cupressus Lawsoniana*, *Garrya elliptica*, Hollies (green and variegated), Ivy (sorts), *Juniperus prostrata*, *J. Fabiana*, Portugal Laurel, *Mahonia aquifolia*, *Podocarpus japonica*, Privet (sorts), *Ruscus aculeatus*, *Thujopsis borealis*, *T. dolabrata*, Yews (sorts).

Observations (by Messrs. Jeffries)—We have probably suffered more severely than many of our neighbours in consequence of the very exposed situation of our nursery. It is gratifying to know that such charming trees as *Juniperus japonica aurea* and *J. chinensis aurea* are not affected by frosts, and do not suffer from E. winds, so destructive to *Thuja aurea*, *T. sempervirens aurescens* and *T. elegantissima*.

4. CIRENCESTER, Preston House.—H. T. Elwes, Esq.

Gen. Char. of Soil—Thin, but rather sticky and poor, resting on Oolite brash.

Alt. and Exposure—About 300 ft. ; not much sheltered.

Rainfall, 1880—[Cirencester, alt., 355 ft. ; ht., 1 ft. ; 38·10 ins., on 174 days].

Date of Onset and Duration of Frost, 1880-81—As I was in India during the whole of the winter I cannot speak personally as to the severity of the weather, but the 18th of January seems to have been a day which for extreme cold combined with a high wind and snow, has never been equalled in the memory of living people. Many men, horses, sheep and deer died of cold on that day and night in the neighbourhood of this place.

Min. Temp. and Date—[Cirencester, Jan. 22nd, -0°·3].

Plants injured, 1880-81—Judging by the appearance of trees and plants when I returned, I can fully believe the above report; while those from the country generally agree with my own observations; namely, that many trees and shrubs which had survived the two preceding years, though more or less injured, succumbed not only in early spring but in May, when the weather was for a time extremely hot and dry.

Observations—*Araucaria*, the largest in the neighbourhood, is dead. Brassica tribe, every variety in fields and gardens were completely killed, except a few plants of the "Major Green." Twenty acres of "Thousand Head" Cabbage, which has hitherto been con-

sidered perfectly frost proof, were so killed that not a stem sprouted in spring. Cedrus Deodara, this is more browned and injured than I ever saw them. Larch plantations, which had been suffering before, are now worse than ever. Wellingtonias suffered as much as the Deodaras. Many fields on light land though planted before Michaelmas were completely ruined by the force of the wind which blew the earth away from the roots, so that the plants died. Five out of seven Wheat-fields on my farm had to be re-sown, and the snow which followed this great storm was in many cases not melted till six weeks afterwards. Willows, many old trees along the course of the Churn had their upper parts killed. On the whole, it may be said, that the winter of 1880-81, though not following so inclement a season as the previous one, was even more serious in its results.

5. CIRENCESTER, Royal Agr. College.—Mr. H. Miller.

Gen. Char. of Soil—Calcareous.

Alt. and Exposure—434 ft.; exposed.

Rainfall, 1880—36·66 ins.; max., July, 7·15 ins.; min., Jan., 765 ins..

Date of Onset and Duration of Frost—Frost occurred from Oct. 30th to Nov. 4th, min. temp., 25°; Nov. 9th and 10th, min. temp., 22°; Nov. 17th to 23rd, min. temp., 15°; Jan. 6th to 27th, 10°.

Min. Temps. and Dates—Nov. [22nd ?], 15°; Jan. [22nd ?], 0°.

Plants injured, 1880-81—Laurel, Bay, 1. Laurel, common, kd. to grd., 2. Vegetables, all, 1.

Observations—Roses have stood fairly well; Dwfs. on Manetti, being much the most fortunate; out of 112, 4 only were lost. Shrubs that have perished were all transplanted last autumn, excepting Bay Laurel, which stood in a very exposed situation. Common Laurels seemed to have perished, but are breaking and making strong growth. Vegetables, the frost made a clean sweep of them; not one Broccoli, Brussels sprout or Kale, Cottagers or Scotch, escaped; most of the autumn planted Cabbages perished. The long continued and cutting East wind seemed to complete the terrible disaster.

6. FALFIELD, Tortworth Court.—Mr. T. Shingles.

Gen. Char. of Soil—A sandy loam, of Old [New ?] Red Sandstone formation.

Alt. and Exposure—265 ft.; exposed to S.E.

Rainfall, 1880—[Berkeley, dist., 5 ms., N.; alt., 60 ft.; 30·09 ins., on 143 days].

Date of Onset and Duration of Frost—Oct. 3rd, 30°; never below 23°, until Jan. 1881; frost terminated on 27th.

Min. Temp. and Date—Jan. 18th, 3°.

Plants injured, 1880-81—34 (1), 35 (2), 27 (3)—Almond, 3. Aloysia citriodora, 1. Aralia papyrifera, 1. Araucaria imbricata, 3. Arbutus Andrachne, 2; A. procera, 2; A. Unedo, 2. Aristolochia Siphon, 2. Arthrotaxis selaginoides, 3. Artichoke, globe, 2. Arundo conspicua, 1. Azara microphylla, 2. Berberidopsis corallina, 1. Berberis Darwinii, 2; B. japonica, 2. Borecole, 3. Broccoli, Cooling's Matchless, Dilcock's Bride, Leamington, Penzance, Snow's Winter White, all, 1. Brussels sprouts, 1. Buddleia globosa, 1; B. Lindleyana, 1. Cabbages, 3. Camellias, 3. Ceanothus azureus, 1. Cedrus Deodara, 3; C. Libani, 3. Celery, 1. Clematis Jackmanni, 3. Colletia ferox, 3. Coronilla glauca, 1. Cotoneaster Simonsii, 3. Crataegus Pyracantha, 3. Cryptomeria elegans, 2. Cupressus torulosa, 2. Daphne Laureola, 3. Deutzia scabra, 3. Echeveria metallica, 1. Endive, 1. Escallonia Ingrami, 2; E. macrantha, 1; E. montevidensis, 2. Eucalyptus globulus, 1. Euonymus japonicus, 1. Fabiana imbricata, 1. Figs, 2. Forsythia viridissima, 3. Furze, 3. Garrya elliptica, 1. Gladiolus, 1. Gunnera scabra, 1. Habrothamnus, 1. Hydrangea arborescens, 3; H. Hortensia, 3; H. japonica, 3. Hymenanthera crassifolia, 2. Hypericum balearicum, 3; H. Calycinum, 3. Jasminum nudiflorum, 2; J. officinale, 2. Juniperus, 1. Kale, 3. Kalmia latifolia, 2. Lapageria rosea, 2. Laurel, Bay, 3. Laurel, common, 3; L. Portugal, 3. Laurustinus, 1. Lavender, 2. Leycesteria formosa, 3. Libocedrus chilensis, 2. Ligustrum lucidum, 2. Lonicera japonica, 3. Maclura aurantiaca, 2. Magnolia grandiflora, 2. Myrtle, 1. Olearia Haastii, 2. Onions, winter, 1. Osmanthus aquifolius, 2; O. ilicifolius, 2. Pampas grass, 2. Parsley, 2. Phillyrea angustifolia, 2. Phormium tenax, 2. Photinia searolata, 2. Quercus glabra, 2; Q. Ilex, 2; Q. Suber, 2. Raphiolepis ovata, 1. Roses, all young wood mostly killed; but all are breaking from hard wood; Teas, few on Briars, 1. Rosemary, 1. Stocks, 1. Veronica Andersoni, 1; V. salicifolia, 1; V. Traversi, 1. Wistaria sinensis, 3. Yucca filamentosa, 1; Y. gloriosa, 1.

Plants uninjured—Broccoli, Cattell's Eclipse, Lander's Goshen, Model, Veitch's Wilcox improved; Castanea chrysophylla, Choisy ternata, Eulalia japonica, *Fruit trees*, all Apples, Apricots, Peaches,

Pears and Plums; Lettuces, Bath or Brown Cos, Hick's Hardy White; *Xanthoceras sorbifolium*.

Observations—There are many trees and shrubs which to all outward appearance were quite dead, but which are now pushing well back from the old hard wood. One very remarkable instance is *Photinia serrulata*. The greatest mortality appears to be among the lower growing kinds of shrubs. But many of them also are pushing close to the ground. *Arbutus Unedo*, *Buddleias*, *Escallonias* are among the most hopeless; while *Euonymus*, *Ligustrums*, *Osmanthus* &c. are now showing signs of life.

7. GLOUCESTER, Hardwicke Court.—T. L. B. Baker, Esq.

Alt. and Exposure—Situate on a low flat, a little above the Severn, and especially subject to injury by frost.

Rainfall, 1880—[Gloucester, alt., 39 ft.; ht. 1 ft. 2 ins.; 30·27 ins., on 154 days].

Date of Onset and Duration of Frost—[Cheltenham, dist., 12 ms., E. Severe from Jan. 14th to 18th, 10°; and from 20th to 26th.

Min. Temps. and Dates—[Cheltenham, alt., 184 ft.; Jan. 13th, 10°; 20th, -3°·3].

Plants injured, 1880-81—3 (1), 8 (2), 1 (3)—*Cedrus Deodara*, unhurt since 1861, a few, 2. *Cryptomeria Lobbii*, top shoot kd., 2. *Cupressus macrocarpa*, lower branches kd., 2; *C. thurifera*, one, 1; and three, 2; *C. Woolgariana*, 1. *Horsechesnuts*, no blossom, 3. *Laurel*, Bay, kd. to grd., 2. *Laurel*, common, in 1861 "terribly injured," 2; *L. Portugal*, 2. *Laurustinus*, kd. to grd., 2, shooting again, 2. *Roses*, one-fourth of stands., 1.

Plants uninjured—*Cryptomerias*, *Pavia*, yellow and pink.

Observations—*Cedrus Deodara*, in April about one-half seemed nearly dead; generally keeping a few green shoots at the top, but all the lower parts were bare of leaves. In June most of them shot out fresh leaves, but still left several branches dead.

8. GLOUCESTER, Highnam Court.—T. G. Parry, Esq.

Rainfall, 1880—[Gloucester, alt., 50 ? ft.; ht., 1 ft.; 32·33 ins.].

Min. Temps. and Dates—[Cheltenham, dist., 10 ms.; alt., 184 ft.; Jan. 20th, -3°·3].

Plants injured, 1880-81—29 (1), 29 (2), 35 (3)—*Abies Douglasii*, 3. *Aloysia citriodora*, 1. Apples, 3. Apricots, 2. *Aralia Sieboldii*, 1. *Araucaria imbricata*, tops killed where exposed to sharp currents of cold wind, 3. *Arbutus Unedo*, 1. *Artichoke*, globe, 2.

Arundo conspicua, 1; *A. Donax*, 3. *Aucuba japonica variegata*, 3. *Benthamia fragifera*, 1. *Berberis Darwinii*, 2; *B. japonica*, 3. *Borecole*, 2. *Broccoli*, 1. *Brugmansia sanguinea*, 1. *Brussels sprouts*, 2. *Buddleia globosa*, 1. *Cabbages*, 3. *Ceanothus azureus*, 1. *Cedrus Deodara*, 3. *Celery*, 2. *Chimonanthus fragrans*, 3. *Clematis Jackmanni*, 3. *Clianthus puniceus*, 1. *Colletia ferox*, 1. *Coronilla glauca*, 1. *Cupressus Lambertiana*, 3; *C. macrocarpa*, 3; *C. torulosa*, 3. *Cytisus Laburnum*, 3. *Daphne Mezereum*, 3. *Deutzia scabra*, 3. *Dracæna australis*, 1. *Echeveria metallica*, 1. *Elæagnus argentea*, 2. *Endive*, 2. *Erica*, 3. *Escallonia macrantha*, 1; *E. rubra*, 1. *Eucalyptus globulus*, 1. *Euonymus radicans*, 3. *Fitzroya patagonica*, 2. *Forsythia viridissima*, 3. *Fuchsia gracilis*, 2. *Furze*, fl. pl., 1. *Garrya elliptica*, 2. *Gleditschia triacanthos*, 3. *Hibiscus syriacus*, 2. *Holly*, variegated, 3. *Hydrangea Hortensia*, 2. *Hypericum balearicum*, 2. *Jasminum nudiflorum*, 3; *J. officinale*, 1. *Laurel*, Bay, 1. *Laurel*, common, 2; *L. Portugal*, 2. *Laurustinus*, 1. *Lavander*, 3. *Lettuce*, 2. *Lilium lancifolium*, 1. *Liquidambar styraciflua*, 3. *Lonicera fragrantissima*, 1. *Magnolia grandiflora*, Exmouth var., 2. *Myrtle*, 1. *Onions*, winter, 3. *Pampas grass*, 2. *Passiflora cœrulea*, 1. *Parsley*, 3. *Paulownia imperialis*, 2. *Phillyrea angustifolia*, 2. *Picea amabilis*, 3; *P. grandis*, 3. *Pinus halepensis*, 1; *P. insignis*, 3; *P. macrocarpa*, tips touched where exposed to cold currents, 3; *P. pinea*, 3. *Piptanthus nepalensis*, 2. *Podocarpus chinensis*, 3. *Quercus Ilex*, 3; *Q. robur*, 2; *Q. Suber*, 2. *Retinospora*, 3 (see below). *Rhododendrons*, 3. *Roses*, H. P.'s, 3; *Tea*, 1. *Rosemary*, 1. *Seaforthia elegans*, 2. *Strawberries*, 3. *Tritoma uvaria*, 2. *Veronica Andersoni*, 1. *Wallflowers*, 2. *Wistaria sinensis*, 3.

Plants uninjured—*Abies Morinda*, *Almond*, *Ampelopsis hederaea*, *A. Veitchii*, *Aristolochia Sipho*, *Asparagus*, *Aucuba japonica*, *Azalea indica*, *Biota orientalis*, *Box*, *Cedrus Atlantica*, *C. Libani*, *Cephalotaxus Fortunei*, *Cotoneaster Simonsii*, *Cratægus Pyracantha*, *Cryptomeria elegans*, *C. japonica*, *Cupressus Goveniana*, *C. Lawsoniana*, *Currants*, *Gooseberries*, *Iris*, *Kalmia latifolia*, *Libocedrus chilensis*, *L. decurrens*, *Lilac*, *Medlar*, *Mulberry*, *Narcissus*, *Nectarines*, *Peaches*, *Pears*, *Penstemons*, *Picea cephalonica*, *P. lasiocarpa*, *P. Nordmanniana*, *P. Pinsapo*, *Pinus excelsa*, *P. insignis* (on high ground and gravelly subsoil), *P. Laricio*, *P. sylvestris*, *Plane*, *Plums*, *Pyrus japonica*, *Quince*, *Retinosporas* (all sorts, as a collec-

tion), *Salisburia*, *Sequoia gigantea*, *Skimmia japonica*, *Taxodium distichum*, *Taxus baccata fastigiata*, *Ulmus*, *Weigela rosea*, *Yucca filamentosa*, *Y. gloriosa*.

9. NORTHLEACH, Sherborne Park.—Mr. A. Scott.

Gen. Char. of Soil—Various, mostly heavy and wet, on a subsoil of limestone and clay.

Alt. and Exposure—405 ft.; in a valley with a hill on the S. side and on the N. Garden slopes gradually to N.

Rainfall, 1880—36·43 ins.

Plants injured, 1880-81—10 (1), 25 (2), 13 (3)—*Ampelopsis Veitchii*, 3. Apples, 2; Adam's Pearmain and Cox's Orange Pippin have last year's wood, all killed. Apricots, 3. *Araucaria imbricata*, 3. Artichoke, globe, 2. Asparagus, many of roots quite killed, 2. Borecole, 1. Broccoli, all, 1. Brussels sprouts, 2. Cabbages, 2. Carnations, 3. Celery, 2. Cherries, 2. *Chimonanthus fragrans*, 1. Clematis Jackmanni, 2; *C. montana*, 2. Currants, 3. *Desfontainea spinosa*, 1. *Euonymus japonicus*, 1; *E. radicans*, 1. Gladiolus, 2. Holly, 2. *Hydrangea Hortensia*, 2. *Jasminum officinale*, 2. Kale, all sorts, 1. Laurel, Bay, 1. Laurel, common, 2; Do. Portugal, 2. Laurustinus, 3. Lettuce, 2. Lilac, 3. *Magnolia grandiflora*, 2; Exmouth var., 2. Mulberry, 2. Nectarines, some young shoots kd. back, 3. Onions, winter, 1. Parsley, 2. Peaches, some young shoots kd. back, 3. *Retinospora*, 3. Roses, dwfs. on own roots, 3; H. P.'s, 3; stands. on Briars, 2; Teas, on wall, all kd. to grd., 1, 2; some on own roots are again pushing from under soil (Roses on their own roots always do best here). Rosemary, 2. Wallflowers, 2. *Wistaria sinensis*, 2. Yew, 3.

10. TETBURY, Westonbirt House.—R. H. Holford, Esq.

Rainfall, 1880—[Cirencester, dist., 10 ms., N.E.; alt., 355 ft.; ht., 1 ft.; 38·10 ins., on 174 days].

Date of Onset and Duration of Frost—[Frost severe at Cheltenham; Jan. 14th to 18th, 10°; and from 20th to 26th]. Severe frost on 10th or 11th of May.

Min. Temps. and Dates—[Cirencester, dist., 10 ms., N.E.; Jan. 22nd, -0°·3; Cheltenham, dist., 18 ms.; or, Jan. 20th, -3°·3].

Plants injured, 1880-81—22 (1), 28 (2), 3 (3)—*Acer ampelopsifolium*, by frost in May, 1. *Arbutus*, 75 p. c., 1; all others, 2. *Arundo conspicua*, 1. *Aucuba japonica*, 2. *Azara microphylla*, one, 1; one kd. to grd., breaking again from root, 2. *Berberidopsis*

corallina, on wall, 1. *Berberis aristata*, shooting, 2; *B. Darwinii*, many, 1, all, 2; *B. fascicularis*, on wall, very old plant, kd. to old wood, shooting strongly, 2; *B. glumacea* (*nervosa*), old plant, 2. *Catalpa*, 6 or 7, must be cut back to trunk, 2. *Cleyera japonica*, 1. *Elæagnus japonica*, kd. to grd., 2. *Escallonia macrantha*, all kd. to grd., 2. *Euonymus japonicus*, all (except on wall), 1; *E. radicans*, 1, 2. *Garrya elliptica*, 2. *Griselinia littoralis*, 1. *Gunnera muricata* and *G. scabra*, one plant of each, slightly protected with fern, damaged in centre, growing, 3. *Ilex balearica* and *T. maderensis*, breaking strong, 2. *Laurustinus*, 1; and kd. to grd., 2. *Ligustrum japonicum*, 1, 2; *L. latifolium*, 1, 2; *L. lucidum*, 1, 2; *L. robustum*, 1, 2. *Liquidambar*, by May frosts, young shoots kd., 2. *Olea-ria Haastii* (all stood, 1879-80), kd. to grd., 2. *Othera japonica*, 1. *Pampas grass*, 1, 2. *Paulownia imperialis*, 3. *Phillyrea buxifolia*, 1, 2; *P. oleæfolia*, 1, 2; *Picea bracteata*, two plants, 2; *P. Pinsapo*, not so much damaged as in 1879-80, 3?. *Pinus insignis*, 6 or 7 young trees, 1; *P. pinea*, 2 or three, 1. *Quercus Buergerii* (Japan), leaves scorched, 3; *Q. Ilex*, lost foliage, 2; *Q. Mirbeckii*, two, 1; *Q. rugosa*, *generensis*, two, 1, one, 2. *Veronica Traversi*, 2.

Plants uninjured—*Acer polymorphum* and vars., e.g. *atropurpureum*, *dissectum*, *palmatifidum*, *septemlobum*, &c., perfectly hardy, but scorched by the May frost; *Euonymus japonicus*, on wall, *Mahonia Bealii*, *intermedia*, and *japonica*; *Osmanthus*, *Phillyrea Vilmo-riana*, unprotected. *Picea amabilis*, *P. cephalonica*, *P. grandis*, *P. lasiocarpa*, *Pinus insignis*, all old trees, one or two only scorched; *P. Koraiensis*, *P. pinea*, one alive.

Observations—One great reason of the ultimate loss of plants has been, not so much the actual cold of any one winter, as the fact that many of these—such as *Arbutus* for instance—that were nearly killed the first winter, after being cut back the next spring, had shot again; but, of course, producing only very late and succulent shoots, were killed by the following winter. Many things which seemed to have survived the winter have since died, as they could not struggle through the continuous bitter E. winds, and the young shoots begun to be put forth were destroyed by the frost of 10th or 11th of May.

11. TEWKESBURY.*

* Post town, but no name or address were given with the Report.

Min. Temps. and Dates—[Cheltenham, dist., 7 ms., S.E.; Jan. 13th, 10°; 20th, -3°·3.]

Plants injured, 1880-81—14 (1), 11 (2), 7 (3)—*Aloysia citriodora*, 2. *Arbutus Andrachne*, 1. Artichoke, globe, 2. *Aucuba japonica*, 3. *Berberis Darwinii*, 2. Borecole, 2. Broccoli, Carter's champion, Purple sprouting, Veitch's autumn, Wilcock's, 1. Brussels sprouts, 1. *Buddleia globosa*, 1; *B. Lindleyana*, 1. Cabbages, 3. Cauliflower, Veitch's late, 1. *Cedrus Deodara*, 3. Celery, 1. Endive, 1. Figs, 2. *Fuchsia Riccartoni*, 2. *Jasminum officinale*, 2. Laurel, Bay, 2. Laurel, Portugal, 3. *Laurustinus*, 1. Lavander, 1. *Leycesteria formosa*, 2. *Lonicera fragrantissima*, 1. *Magnolia grandiflora*, 3. Myrtles, 1. *Photinia serrulata*, 1. *Quercus Ilex*, 2. Roses, stands., on briars, 3; Maréchal Niel and Cloth of Gold, on own roots, 2. Rosemary, 1. *Wistaria sinensis*, 3.

Plants uninjured—Apricots have stood well, but bore little bloom or fruit. Nectarines and Peaches, Barrington, Early Alfred, Elruge, Gros mignonne, Newington, Noblesse and Royal George stood the winter well; most being from the nursery, 1878.

1. HEREFORDSHIRE—HEREFORD.—Dr. H. G. Bull.

Gen. Char. of Soil—A deep clay loam, with a base of gravel.

Alt. and Exposure—From 160 to 220 ft.; general slope of ground to S.

Rainfall, 1880—31·49 ins.; av. is 27·5 ins.

Date of Onset and Duration of Frost—[The frost began, Jan. 7th, and lasted till 27th; on the 26th, max. temp., 19°·2, and on nine other days it was below 32°. The min. temp., below 32° on twenty-two consecutive days, and was below 10° on two series of four consecutive days, with one interposed. The temp. on grass was at or below 0° on six occasions; the min. being -9°·2. Cold, drying winds occurred in March and April; E. wind on 21 days in April. (T. A. Chapman, Esq., Burghill, Hereford)].

Min. Temps. and Dates—[Burghill, alt., 275 ft.; Jan. 15th, 1°·2; 16th, 2°·8; 21st, 3°: Ross, alt., 213 ft.; Jan. 21st, 2°·9: Fownhope, alt., 192 ft., and Canon Frome, alt., 175 ft.; Jan. 22nd, 4°].

Plants injured, 1880-81—10 (1), 11 (2), 12 (3)—*Araucaria imbricata*, 2. *Arbutus Andrachne*, 2. *Aucuba japonica*, 3. *Berberis Darwinii*, 2. *Cedrus Atlantica*, 3; *C. Deodara*, 2; *C. Libani*, 3. *Eucalyptus globulus*, every winter, 1. Figs, kd. to grd., 2. Furze,

1. Holly, old and weak, often, 1 and 3; Do. variegated, 3. Ivy, old and weak, 3. *Jasminum officinale*, 1, 2. Larch, 3. Laurel, Bay, 1. Laurel, common, old and weak, 1, 2; Do. Portugal, 2. *Laurustinus*, 1. *Magnolia grandiflora*, 2. *Quercus Ilex*, lost all foliage, 3. Roses, H.P., 1, 2, 3, and stands., 1, 2, 3, according to age or weakness; Tea, 1. *Sequoia sempervirens*, 2. Yew, 3; Do. fastigate, 3.

Plants uninjured—*Abies Douglasii*, Almond, Apples, Apricots, Asparagus, Elm, *Euonymus europæus*, *Garrya elliptica*, Gooseberries, *Hibiscus syriacus*, *Jasminum nudiflorum*, *Juniperus*, Lilac, *Lonicera japonica*, Mulberry, Nectarines, Oak, Parsley, Peaches, Pears, *Pinus excelsa*, *P. insignis*, *Platanus orientalis*, Plums, *Pyrus japonica*, *Quercus Suber*, Quince, *Rhododendrons*, *Ribes*, *Sequoia gigantea*, Strawberries, Wallflowers, Walnut, *Weigela rosea*, *Wistaria sinensis*.

Observations—The marked peculiarities of the last winter in this district were the loss of all foliage of the *Cedrus Deodara* and *Libani*, *Quercus Ilex* and Yews; and when the trees were unhealthy and weak from any causes, they were killed. The common Ivy was injured very much in some places. Apples, Pears, Plums and Wall Fruit trees were not generally injured (Dr. H. G. Bull). The cold drying winds of March and especially of April did considerable damage in this neighbourhood; in that many things which, with a genial April would have easily recovered, were prevented from so doing from the damage done to them in winter, by the dry cold spring. *Deodars* (12 to 15 yrs. old) especially showed this result. The frost of Jan. weakened them and rendered them as deciduous as Larches. In March all were pushing forward for a fresh growth and made efforts in April; but throughout April and on into May, they were obviously failing, and as the result, one or two nearly died, while others have lost considerable branches (T. A. Chapman, Esq., Burghill, Hereford).

2. HEREFORD, Bryngwyn.—R. J. Rankin, Esq., M.P.

Gen. Char. of Soil—A clay loam.

Alt. and Exposure—420 ft.; exposed to S.E.

Rainfall, 1880—31·09 ins.

Date of Onset and Duration of Frost—Jan. 6th to 26th.

Min. Temps. and Dates—Jan. 14th, 0°; Jan. 19th, 8°; 20th, 6°; 21st, 4°.

Plants injured, 1880-81—25 (1), 29 (2), 11 (3)—*Aloysia citrio-*

dora, 1. Apricots, 3. *Araucaria imbricata*, under shade of other trees, 2. *Arbutus Unedo*, 1. Artichoke, globe, 2. *Arundo conspicua*, 1; *A. Donax*, 1. *Aucuba japonica*, 3; *Do. variegata*, 3. *Berberidopsis corallina*, 1. *Berberis Darwinii*, 2. Borecole, 2. Broccoli, all vars., 1. Brussels sprouts, 2. Carnations, 2. Cauliflower, 1. *Ceanothus azureus*, 2; *C. dentatus*, 2; *C. grandiflorus*, 2. *Cedrus Deodara*, 2. Celery, 3. *Clematis montana*, 2. *Cotoneaster Simonsii*, 2. *Cupressus macrocarpa*, 1. *Deutzia scabra*, 3. *Echeveria metallica*, 2. *Escallonia macrantha*, 2. *Eucalyptus globulus*, 1. *Euonymus japonicus*, 2. Furze, 1; *Do.*, fl. pl., 1. *Garrya elliptica*, 1. *Hydrangea Hortensia*, 1; *H. japonica*, 1; *H. Otaksa*, 1. Ivy, where most protected, most cut, 3; Palmate, var., suffered most. *Jasminum officinale*, kd. to grd., 2. Kale, 2. Laurel, Bay, 1. Laurel, common, 2; L. Portugal, 2. *Laurustinus*, 1. Lavander, 2. Lettuce, all (except Lee's Hammersmith), 1. *Ligustrum lucidum*, 2. *Lonicera japonica*, 2. Magnolia, Exmouth var., 3. Myrtles, 2. Oak, 1. Onions, winter, 2. Pampas grass, 1. Parsley, 3. Penstemons, 2. *Pinus insignis*, 1. *Platanus orientalis*, 3. *Quercus Ilex*, 1; *Q. Suber*, 2. Roses, H. P.'s, 2; stands., one-half, 1; one-half, 2; many on Manetti, 1; Teas, all (some on S. wall), 1. Sequoias, 3; some in low damp places, 2. Strawberries, 3. *Tritoma uvaria*, 2. *Veronica Andersoni*, 1.

Plants uninjured—Conifers, very little injured excepting those mentioned; Ivy, not injured where fully exposed at all times; Lettuce, Lee's Hammersmith only; Roses, dwfs., on own roots.

3. KINGSLAND, Croft Castle.—Mr. W. Bytheway.

Gen. Char. of Soil—Light, with limestone below.

Alt. and Exposure—About 200 ft.; sheltered on N. by elevated ground.

Rainfall, 1880—Rain fell on 76 days (16 days in July), snow on 6 days. [Leominster (Farm), dist., 5 ms., S., alt., 240 ft., 33·45 ins.].

Date of Onset and Duration of Frost—First frost on Oct. 20th, 23°, continued till Nov. 10th; Nov. 16th to 23rd; Dec. 17th with much snow to Dec. 31st; Jan. 3rd to 27th. Snow, Feb. 11th to 14th.

Min. Temp. and Date—15th, 8°.

Plants injured, 1880-81—6 (1), 22 (2), 11 (3)—Artichoke, globe, 2. Borecole, 3. Broccoli, 1, 2, 3. Brussels sprouts, 2. *Buddleia globosa*, 2. Carnations, 2. Cauliflower, 1, 2. *Ceanothus americanus*, 2. Celery, 2. Endive, 2. *Eucalyptus*, 1. *Euonymus japonicus*, 2.

Kale, 3. Laurel, common, lost many leaves, 3; round-leaved, 2; Portugal, 3. Laurustinus, 2. Lettuce, 2. Leycesteria formosa, 3. Myrtles, 1. Nectarines, wood cut back, 2, 3. Parsley, 3. Peaches, 2. Quercus glabra, 2; Q. Ilex, 2. Rhododendrons, 3. Roses, Tea, 3. Santolina chamæcyparis, 3. Stocks, 1. Tritoma uvaria, 2. Veronica Traversi, 1. Wallflowers, 2. Yucca aloifolia, 2.

Plants uninjured—Abies Douglasii, Apples, Apricots, Araucaria imbricata, Asparagus, Auriculas, Aucuba japonica, Beech, Berberis Darwinii, B. vulgaris, Biota orientalis, Camellias on wall, Castanea vesca, Cedrus Atlantica, C. Deodara, Cherries, Cotoneaster microphylla, Cryptomeria elegans, C. japonica, Do. elegans, Cupressus Lawsoniana erecta viridis, Currants, Euonymus radicans, Furze, Gladiolus, Gooseberries, Holly, Do. variegated, Hyacinths, Ivy, Do. variegated, Jasminum nudiflorum, Juniperus, Bay Laurel, Lavander, Lilac, Lobelia Queen Victoria, Lonicera fragrantissima, L. japonica, Magnolia grandiflora against wall, Medlar, Mulberry, Oak, Winter Onions, Pears, Phlox, Pinus excelsa, P. Laricio, P. sylvestris, Plane, Plums, Privet, Pyrus japonica, Quince, Rosemary, Roses (dwfs.), Sequoia gigantea, Spinach (Prickly), Strawberries, Taxodium distichum, Thujopsis borealis, Walnut, Weigela rosea, Wistaria sinensis, Yew, and fastigate var.

1. SHROPSHIRE — MARKET DRAYTON, Buntingsdale. — Mr. H. Coombs.

Gen. Char. of Soil—A light loam with a dry subsoil of sand and gravel.

Alt. and Exposure—276 ft.; exposed to N.E. and W.

Rainfall, 1880—34.49 ins., on 151 days.

Date of Onset and Duration of Frost—Dec. 17th to end of month. A few days of mild weather followed. Severe frost on Jan. 7th till end of month.

Min. Temps. and Dates—Jan. 15th, 0°; 16th, -1°.

Plants injured, 1880-81—9 (1), 10 (2), 9 (3)—Abies Douglasii, 3. Apricots, 2. Artichoke, globe, many, 1; a few, 2. Aucuba japonica, 2. Borecole, 1. Broccoli, 1. Brussels sprouts, 1. Cabbages, 3. Cauliflower, under hand-glasses, 1; others, 2. Cedrus Deodara, 2; C. Libani, 2. Celery, 2. Cryptomeria elegans, 3; C. japonica, 3. Endive, 1. Kale, 1. Laurel, Bay, 1. Laurel, common, has suffered more than other shrubs, 2; Portugal, 3. Laurustinus, 1. Let-

tuce, 3. Onions, 2. Parsley, 3. Penstemons, 1. Picea Pinsapo, 3. Roses, dwfs., 2; standards, 2. Sequoia gigantea, 3.

2. SHREWSBURY, Attingham.—Mr. G. Pearson.

Gen. Char. of Soil—Loam and gravel.

Alt. and Exposure—Rather low, between the Severn and the Tern.

Rainfall, 1880—[Shrewsbury, dist., 5 ms.; alt., 240 ft.; 29·07 ins.].

Date of Onset and Duration of Frost—Commenced in Nov., temp. being below 32° thirteen times. Then from Jan. 6th, very severe until 27th.

Min. Temp. and Date—Jan. 16th, -5°.

Plants injured, 1880-81—14 (1), 16 (2), 7 (3)—Apricots, 3. Araucaria imbricata, 2. Arbutus Andrachne, 3; A. Unedo, 1. Artichoke, globe, 2. Aucuba japonica, 3. Berberis Darwinii, 1. Borecole, 2. Broccoli, all sorts (except a few late planted, Sutton's late Queen), 1. Brussels sprouts, 2. Cabbages, 1. Cauliflower, 1. Cedrus Deodara, 2. Celery, 2. Euonymus japonicus, 1. Figs, 1. Furze, 1. Hydrangea Hortensia, 2. Hypericum Calycinum, 2. Jasminum officinale, 1. Juniperus, 3. Kale, 3. Laurel, Bay, 1. Laurel, common, 2; Portugal, 2. Laurustinus, 1. Lavander, 2. Onions, winter, 2. Quercus Ilex, 3; Q. Suber, 3. Rosemary, 1. Roses, dwfs., 2; stands. on briar, 1; Tea, 2. Tritoma uvaria, 1, 2. Yucca filamentosa, 2.

1. WARWICKSHIRE—RUGBY, Stockton Rectory.—Rev. W. Tuckwell.

Gen. Char. of Soil—Stiff, Blue Lias clay.

Alt. and Exposure—289 ft.; fairly sheltered.

Rainfall, 1880—30·31 ins.

Date of Onset and Duration of Frost—Jan. 6th to 28th.

Min. Temp. and Date—In air, 5 ft. from ground, Jan. 21st, 3°.

Plants injured, 1880-81—18 (1), 3 (2)—Arbutus Unedo, 1. Asparagus (nearly all the beds), 1. Berberis Darwinii, 1. Cabbages, 1. Clematis Jackmanni, 1. Ecremocarpus scabra, 1. Figs, 1. Forsythia elegans, 2. Laurel, common, 1. Lavatera arborea, 1. Liriodendron tulipifera, 1. Lonicera japonica, 1. Magnolia grandiflora, 1. Phormium tenax, 2. Platanus orientalis, 2. Roses, H. P.'s and stands., 10 p. c., 1; Tea, Gloire de Dijon, on wall, 1. Ruta graveolens, variegata, 1. Vines, Black Hamburgh, 1. Wallflowers, 1. Wistaria sinensis, 1.

Observations—The havoc is most marked amongst Laurels. From a very thick hedge of fine trees, one-third were injured the winter before last (1879-80), and are now all gone. Of several Gloire de Dijon Roses against a wall, the old ones, planted 15 years ago, are dead or injured; while the young ones planted two years ago are almost unhurt.

3. STRATFORD-ON-AVON, Charlecote.—Mr. T. Rogers.

Gen. Char. of Soil—A very adhesive loam.

Alt. and Exposure—[About 125 ft. ?]—The kitchen garden is sheltered by large elm trees on N. The slope is considerable down to the river Bourne.

Rainfall, 1880—[Stratford-on-Avon, dist., 4 ms.; alt., 123 ft.; 29·75 ins.].

Min. Temp. and Date—Jan. 21st, 4°.

Plants injured, 1880-81—10 (1), 13 (2), 11 (3)—*Aloysia citrodora*, 3. Apricots, were much ruptured in bark, 2. Artichoke, globe, 2. *Aucuba japonica*, 3. *Berberis Darwinii*, 3. *Biota orientalis*, 3. Borecole, 2. Broccoli, Dilcock's Bride, Leamington, Snow's, Veitch's self-protecting, all laid down, and though stems were alive, hearts were all gone, 1; (the few that *survived* were Burleigh Champion, Gilbert's, and Watts's Excelsior). Brussels sprouts, 1. Cabbages, 2. Carnations, 3. Cauliflower, 1. *Cedrus Atlantica*, 3; *C. Deodara*, 3. Celery, 3. Clematis Jackmanni, 3. *Cryptomeria japonica*, 2. *Cupressus Lawsoniana*, 3. *Echeveria metallica*, under cool frame, 1. Endive, 1. *Jasminum nudiflorum*, 3; *J. officinale*, 2. Kale, 2. Laurel, Bay, 1. Laurel, common, 1. *Laurustinus*, 2. Lettuce, 2. *Lonicera fragrantissima*, 1. Myrtle, 1. Onions, winter, 2. Parsley, 2. Roses, Teas on briar, 1; on own roots, 2. Wallflowers, 2. *Wistaria sinensis*, fine plant, 1.

4. WARWICK, The Priory.—Mr. R. Greenfield.

Gen. Char. of Soil—Light and sandy on Red Sandstone rock.

Alt. and Exposure—230 ft.; sheltered on N. and N.W.; exposed on S. and S.E.

Rainfall, 1880—30·35 ins.

Date of Onset and Duration of Frost—Oct. 19th, till April 21st; 89 nights of frost.

Min. Temp. and Date—Jan. 20th, 4°.

Plants injured, 1880-81—32 (1), 56 (2), 28 (3)—*Abies Douglasii*, 3. *Arbutus Unedo*, 1, 2. *Arundo conspicua*, 1, 3. *Aucuba japonica*,

1, 2. *Do. variegata*, 1, 2. *Biota orientalis*, 2. Borecole, 1, 2. Broccoli, Backhouse's, Carter's, Cooling's matchless, Lander's Goshen, Leamington, Model, Snow's, Veitch's Spring, all, 1 (excepting about 40 plants). Brussels sprouts, 2. Cabbages, 1, 2. *Catalpa syringæfolia*, 2. Cauliflower, 1, 2. *Ceanothus dentatus*, 1, 2. *Cedrus Atlantica*, 3; *C. Deodara*, 1, 2 [see below]; *C. Libani*, 2. Celery, 2. *Cotoneaster microphylla*, 2. *Cratægus Pyracantha*, 3. *Cryptomeria elegans*, 3. *Cupressus borealis*, 2; *C. Lawsoniana*, 3; *C. macrocarpa*, 3; *C. sempervirens*, 3. *Dracæna australis*, 1, 2. Endive, 1, 2. *Escallonia macrantha*, 2. *Eucalyptus globulus*, 1. *Euonymus europæus*, 3; *E. japonicus*, 1, 2; *E. radicans*, 2. *Fuchsia Riccartoni*, 2. Furze, fl. pl., 2. *Hydrangea japonica*, 3. Holly, 2 [see below]. *Hypericum calycinum*, 2. Ivy, 3; *Do. variegated*, 2. *Jasminum nudiflorum*, 3; *J. officinale*, 3. Kale, 2. *Kalmia latifolia*, 3. Laurel, Bay, 1, 2. Laurel, common, 1, 2; *Do. roundleafed*, 2; *Do. Colchica*, 3; *Do. Caucasica*, 3; *Do. Portugal*, 1, 2. *Laurustinus*, 1, 2. Lavander, 1, 2. Lettuce, 2. *Lilium auratum*, 1, 2; *L. lancifolium*, 1, 2. *Magnolia grandiflora*, 2. Myrtle, 3. *Negundo fraxinifolia*, 2. Onions, winter, 3. *Passiflora cœrulea*, 1, 2. Parsley, 3. *Paulownia imperialis*, 1, 2. Peaches, 3. *Picea amabilis*, 3; *P. grandis*, 2; *P. lasiocarpa*, lost all foliage, 2; *P. Nordmanniana*, 2; *P. Pinsapo*, lost all foliage, 2. *Pinus excelsa*, 3; *P. Laricio*, 3. Privet, 2. *Quercus Ilex*, 2. *Retinospora*, 3. Rhododendrons, 3. Rosemary, 1, 2. Roses, dwarfs, 3; H.P., 3; stands. on briar, 25 p. c., 1; others, 2; Tea on own roots or Manetti, 1, 2. *Santolina chamæcyparis*, 1, 2. *Sequoia gigantea*, 2. *Taxodium distichum*, 2. *Tritoma uvaria*, 1, 2. *Veronica Andersoni*, 1, 2. Wall-flowers, 1, 2. Yew, 2; *Do. fastigiata*, 3. *Yucca filamentosa*, 3; *Y. recurva*, 2.

Observations—*Cedrus Deodara*, trees, from 25 ft. to 30 ft. high, were killed to the ground. The very few which survived were denuded of all foliage and resembled deciduous trees. Hollies, about 40 different varieties, strong growing sorts, were pretty well stripped of all their leaves while the young growths were cut back; *Hodginsii*, golden varieties, and *Maderensis*, suffered most. Some common Hollies were killed, 6 to 10 ft. high, on high and exposed places. Yews, a great many hedges presented a pitiful sight, all being scorched more or less; the sides facing S.E. being very much injured.

DIVISION VII.—N. MIDLAND COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881,
FROM DERBYSHIRE, LEICESTERSHIRE, LINCOLNSHIRE AND RUTLAND.

DERBYSHIRE. Year exceedingly wet, especially the latter part (Worksop). *Rainfall*, above av. of 10 yrs. (Brimington Hall). Min. rainfall, Trent Coll., alt., 120 ft.; ht., 1 ft.; 28·65 ins., on 166 days: max., Buxton, alt., 989 ft.; ht., 5 ft.; 59·32 ins., on 162 days. *Min. temps.*, near Melbourne, Jan. 16th, 17th, -2° : Trent College, Jan. 14th, 1° : Buxton, alt., 990 ft.; Jan. 25th, $1^{\circ}2'$: Belper, alt., 344 ft.; Jan. 15th, $6^{\circ}5'$.

Plants injured, 1880-81 — 66 (1), 70 (2), 37 (3), total at 3 places.

LEICESTERSHIRE. *Rainfall*, heaviest since 1863 (Bruntingthorpe). Spring, very cold and dry; sum., except Aug., very wet, cloudy, sunless and chilly; aut., very wet; early days in Sept., unusually hot; Nov., very cold; Dec., mild (Kilby). *Rainfall*, 5·61 ins. above av. of 12 yrs. (Syston); 5·72 ins. above av. (Loughborough). Min. rainfall, Loughborough, alt., 287 ft.; ht., 9 ins.; 32·74 ins., on 162 days: max., Market Harboro', ht., 2 ft. 6 ins.; 37·66 ins., on 144 days. Jan. 1881, severe frost from 7th to 27th; from 14th to 21st the max. temp. was below 31° : snow on 18th with E. gale and deep drifts (Loughborough). *Min. temps.*, Wanlip Hall, Jan. 15th, -4° ; 16th, 0° ; 17th, 4° ; 18th, 16° with E. wind: Coston, alt., 300 ft.; Jan. 16th, -2° : Loughborough, alt., 169 ft.; Jan. 15th, 16th, $1^{\circ}9'$: Belvoir Castle, Jan. 15th, 3° : Leicester, alt., 237 ft.; Jan. 15th, $5^{\circ}2'$.

Plants injured, 1880-81 — 74 (1), 86 (2), 61 (3), total at 4 places.

LINCOLNSHIRE. *Rainfall*, heavy in Aug., Sept. and Oct. (Tydd Gote); 13 ins. above av. of 30 yrs. (Spalding); the greatest on record (Boston, Stubton, &c.). Min. rainfall, Crowle, alt., 10 ft.; 24·71 ins., on 134 days: max., Louth, alt., 380 ft.; ht., 1 ft.; 38·45 ins., on 181 days. Jan. 1881, much mist and fog during the month; mean temp. at 9 a.m., $22^{\circ}3'$ (Partney). *Min. temps.*, Appleby, alt.,

60 ft. ; Jan. 15th, -1° : Boston, alt., 24 ft. ; Jan. 15th, 2° : Kelstern, alt., 388 ft. ; Jan. 15th, $2^{\circ}5$: Partney, Jan. 17th, 4° : Bucknall, alt., 100 ft. ; Jan. 15th, 16th, 5° : Skegness, Jan. 24th, 7° : Killingholme, alt., 60 ft. ; Jan. 15th, 21st., 9° .

Plants injured, 1880-81—37 (1), 31 (2), 30 (3), total at 2 places.

RUTLAND. *Rainfall*, of many rainy days, but not heavy, in Feb. and April ; heavy falls on 3 or 4 consec. days in June, July, Sept., Oct. and Nov. (Uppingham). The most disastrous year ever known in the Midlands. In July, greatest flood at Stamford [dist., 2 ms., S.] since 1640 (Tolethorpe Hall). *Min. rainfall*, Oakham (Gree-tham) ; ht., 8 ins. ; 32·87 ins., on 159 days : max. (Uppingham), ht., 1 ft. 1 in., 35·66 ins. *Min. temps.*, Ketton, alt., 130 ft. ; Jan. 20th, -4° : Uppingham, alt., 485 ft. ; Jan. 16th, $9^{\circ}5$.

Plants injured, 1880-81—1 (1), 10 (2), 12 (3), total at 1 place.

REPORTS.

1. **DERBYSHIRE**—ASHBOURNE, Ashbourne Hall.—Mrs. Frank.

Gen. Char. of Soil—A deep loam ; subsoil of gravel.

Alt. and Exposure—500 ft. ; S. and E.

Rainfall, 1880—Bradbourne Hall [dist., 4 ms., N.], 35·7 ins.

Date of Onset and Duration of Frost—Jan. 9th till April 8th.

Min. Temp. and Date—Jan. 29th, 9° .

Plants injured, 1880-81 — 21 (1), 19 (2), 7 (3) — *Ampelopsis Veitchii*, 1. Apples, all kinds, 3. Apricots, 2. *Arbutus Unedo*, 3. Artichoke, globe, 1. *Arundo conspicua*, 3. *Aucuba japonica*, 1 ; *Do. variegata*, 1. *Berberis Darwinii*, 1. Borecole, 2. Broccoli, Veitch's self-protecting, 1. Brussels sprouts, 1. Cabbages, Red, Savoy, Enfield market, 2. Carnations, 2. Celery, 2. *Coronilla glauca*, 1. *Cotoneaster microphylla*, 3 ; *Do. Simonsii*, 3. Endive, 1. *Escallonia macrantha*, protected by boughs, 1. *Euonymus japonicus*, 2. Figs, 1. Furze, 2. Holly, 1 ; *Do. variegated*, 1. Ivy, 2 ; *Do. varieg.*, 2. *Jasminum officinale*, 2. Kale, 1. Laurel, Bay, 1. Laurel, common, 1 ; *Do. Portugal*, 2. Lavander, 3. *Lonicera fragrantissima*, 2 ; *L. japonica*, 1. Onions, winter, Tripoli, 1. Parsley, 2.

Penstemons, 1. Pinus excelsa, 1. Roses, dwfs., 2; H. P.'s, 2; stands., on common briar, 1. Strawberries, 3. Vines, Sweetwater, 2. Wallflowers, 2. Yew, 2. Yucca filamentosa, 1.

Plants uninjured—Currants and Gooseberries; Echeveria metallica, in most exposed places; Holly (see below); Lavander, four plants; Rhododendrons, the common and better kinds, exposed to E. and N., in clumps; Wallflowers, only those under W. wall.

Observations—Apples, those injured are stands., Keswick Codling, Lord Suffield, Manx Codling. Aucubas were kd. to grd. last year; and the roots with all the summer growth are destroyed this winter. Cabbages, and all similar crops, were totally destroyed, although the vegetable garden is sheltered partially by walls. Ivies, of even the commonest kind in the most sheltered places, are all but killed. Hollies, those best sheltered from the N. and E. are killed; but some standing exposed to all winds have taken very little harm. Very few out of 200 are left. In the hedges one is killed down, but another 100 yards off is uninjured. Lavander, 24 plants are killed and 4 left untouched.

2. DERBY, Melbourne.—[Locality and name omitted from Rep.].

Date of Onset and Duration of Frost—Oct. 3rd, 1880; May 11th, 24°.

Min. Temps. and Dates—Jan. 16th and 17th, -2°: [Trent Coll., dist., 8 ms., N.E.; alt., 120 ft.; Jan. 14th, 1°].

Plants injured, 1880-81—29 (1), 41 (2), 9 (3)—Abies Douglasii, 2; A. excelsa, 2; A. Morinda, 2 (all recovering). Ampelopsis Veitchii, 1. Apples, all stands. (excepting Early Julien, Keswick Codlin and Alfri-ston), 1, 2. Apricots, old trees unprotected, nearly all, 1. Arancaria imbricata, last year's wood dead, 3. Artichoke, globe, 1. Asparagus, many crowns dead, 1, 2. Aucuba japonica, lost leaves but breaking, 2; Do. variegata, 2. Berberis Darwinii, 1; B. japonica, 2. Biota orientalis, 3. Borecole, 2. Broccoli, mostly, 1. Brussels sprouts, all which were not covered by snow, Jan. 18th, 1. Box, 3. Cabbages, Cauliflower and Curled Greens, 1. Ceanothus azureus, 1. Cedrus Atlantica, lost most of its leaves, will recover, 2; C. Deodara, all, 1. Cherries, 2. Clianthus puniceus, 1. Cotoneaster microphylla, 1. Cryptomeria elegans, 3. Dracæna australis, 1. Echeveria metallica, 2. Endive, 1. Escallonia macrantha, 1. Euonymus radicans, 2. Furze, 1. Garrya elliptica, 3. Holly, 2; Do. variegated, 2. Hypericum Calycinum, 2. Ivy, 2; Do. variegated, 2. Jasminum nudi-

florum, 2. Kale, 2. Laurel, Bay, 1. Laurel, common, 1; Do. Caucasian, 1; Do. Portugal, 1. Lavander, 1. Lettuce, 1. Ligustrum lucidum, 2. Lilac, 3. Myrtle, 1. Nectarines, Downton and Elruge, 2. Onions, winter, 2. Pampas grass, 1. Peaches, Bellegarde, Late Admirable and Red Magdalen, 2; Royal George, 3. Pears, fruitless for 2 or 3 seasons, 3. *Picea cephalonica*, young growth cut back with late frosts, 2; *P. Pinsapo*, lost most of leaves, 3. *Pinus excelsa*, 2; *P. insignis*, 2; all very much browned. *Quercus Ilex*, old tree, 1; young, 2. *Retinospora ericoides*, 1; *R. pisiifera alta spica*, 1. *Rhododendrons*, *Blattenum*, 2; *R. Catawbiense Everestianum*, 2; *R. celebrandum*, 2; *R. Elfrida*, 2; *R. Queen of the West*, 2; *R. Venus*, 2; *R. Woolleri*, 2; the trusses of those that were well set were nearly all killed. Roses, dwfs., 1; stands on briars, more than half, 1; rest, 2. *Sequoia gigantea*, last season's wood kd., 2; *S. sempervirens*, 2. *Skimmia japonica*, 2. Wallflowers, 1. Walnut, 2. *Wistaria sinensis*, 1.

3. WIRKSWORTH, Hopton Hall.—Mr. G. Bolas.

Gen. Char. of Soil—Calcareous, being entirely on limestone.

Alt. and Exposure—[Holloway, dist., 4 ms.; alt., 500 ft.]. Well sheltered from N.E. and N.W. by hills and trees.

Rainfall, 1880—122 wet days, up to Dec. 6th; 20 very heavy storms [Holloway, alt., 450 ft.; ht., 1 ft. 1 in.; 52·53 ins., on 193 days].

Min. Temp. and Date—[Belper, dist., 7 ms., S.E.; Jan. 15th, 60·5].

Plants injured, 1880-81—18 (1), 10 (2), 21 (3)—*Aloysia citriodora*, 1. *Ampelopsis hederacea*, 3; *A. Veitchii*, 3. *Arbutus Unedo*, 1. Artichoke, globe, 1. *Arundo conspicua*, 1. Asparagus, 3. *Aucuba japonica variegata*, 3. *Berberis Darwinii*, 3; *B. japonica*, 3; *B. vulgaris*, 3. *Biota orientalis*, 1. Borecole, 1. Broccoli, 1. Cabbages, 1. *Ceanothus americanus*, 3. *Chimonanthus fragrans*, 3. *Clematis montana*, old plant, 1. *Cotoneaster Simonsii*, 1. *Cryptomeria japonica*, 3. *Cupressus sempervirens*, 3. *Daphne indica*, 3; *D. Mezereum*, 3. *Echeveria metallica*, 1. *Escallonia macrantha*, 3. *Eucalyptus globulus*, 1. *Euonymus japonicus*, 3; *E. radicans*, 3. *Garrya elliptica*, 2. *Hypericum Calycinum*, 2. Kale, 1. Laurel, Bay, 1. Laurel, common, 3. Lavander, 2. *Leycesteria formosa*, 1. *Ligustrum lucidum*, 2. *Magnolia grandiflora*, 2. Pampas grass, 1. *Passiflora cœrulea*, 3. Parsley, nearly all, 1. *Retinospora*, 3.

Rosemary, 1. Roses, stands., 3. *Sequoia gigantea*, 2. *Skimmia*, 2. *Tritoma uvaria*, 2. Wallflowers, 2. *Wistaria sinensis*, 2. *Yucca filamentosa*, 1.

Observations—Many of the above plants are trained to walls; having had many losses I am induced to grow them so. Many that were kd. to the grd. are now pushing up strong; *e.g.* *Ampelopsis bipinnata*, *Ceanothus americanus*, *Clematis montana*, *Passiflora coerulea*, *Vitis flexuosa*, purple vine, and *Wistaria sinensis*. *Anthericum* and *Aquilegias* are very strong and full of flower. *Arbutus* and *Arundo conspicua*, which stood the winter of 1879-80, were killed in 1880-81. *Berberis*, of sorts, planted in autumn against wall, were kept green and healthy, and are now making good growth. *Brassica* family, generally, has suffered more this year than ever before, for 20 yrs.; Brussels sprouts, however, withstood every thing and are finer than usual; of Broccolis, Sutton's late Queen was the only variety that did well out of six sorts; Cabbages were all killed; so also was Cottager's Kale in spring. Carnations are a success; they were layered early and planted out as soon as ready, and none died last winter nor in that of 1879-80, that were so treated. *Ceanothus Veitchii* and *Cistus ladaniferus*, planted last autumn against wall, are making good growth. Clematises, that are annually cut down, seem to stand far better than those left to form a trunk; several left some 7 years are very weak and breaking badly. Delphiniums are stronger this year. *Erica mediterranea*, 9 years old, have mostly three-parts killed; the limestone formation does not suit Heaths, so that most varieties dwindled away excepting *E. med.*, which did well till 1880. *Euonymus*, planted early last aut. against wall, has done well. *Leycesteria formosa*, which stood the last two winters, was killed in 1880-81. Phlox and *Pyrethrum* are strong this year. Roses, dwfs., are excellent on the Manetti, and quite as strong as seedling briars, which throw up more suckers than the Manetti; stands. on briars have suffered worse this year than any, many being not more than 3 yrs. old. Teas, have all stood well. Climbing *Devoniensis* &c., that made strong shoots, have got partially killed; but all made good growth. Teas in the open, Gloire de Dijon and seedlings are all strong and robust (June 11, 1881).

1. LEICESTERSHIRE — BOTTESFORD, Belvoir Castle. — Mr. W. Ingram.

Gen. Char. of Soil—[See p. 81].

Alt. and Exposure—[See p. 81].

Rainfall, 1880—35·48 ins.

Date of Onset and Duration of Frost—Oct. 20th, 23°; with short intervals of mild weather, Nov. was marked by frost, viz., on 17 days. It continued throughout Dec., Jan., Feb., and on 12 days in March, 1881.

Min. Temp. and Date—Jan. 15th, 3°.

Plants injured, 1880-81—21 (1), 24 (2), 32 (3)—*Aloysia citrodora*, 1. *Aralia*, near wall, 1. *Araucaria imbricata*, in low situations near water, 1. *Arbutus Andrachne*, 3; *A. procera*, 3; *A. Unedo*, 3. *Artichoke*, globe, 3. *Arundo conspicua*, 3; *A. Donax*, 3. *Asparagus*, 2. *Aucuba japonica*, 2. *Azalea amæna*, 2; *A. indica*, 3. *Berberis Darwinii*, 2. *Borecole*, 3. *Broccoli*, Cattell's Eclipse, 10 p. c., 1; Frogmore protecting, one-half, 1; Leamington and Cooling's matchless, 65 p. c., 1; Autumn self-protecting, one-half, 1; Penzance and Snow's early, 1. *Camellias*, 3. *Catalpa syringæfolia*, 2. *Ceanothus azureus*, 2; *C. dentatus*, 2; *C. Deodara*, 3; *C. Libani*, several 80 to 100 years old, on cold wet soil, from flooding, 1; others more favourably situated, 3. *Celery*, 2. *Cercis siliquastrum*, 2. *Chamærops Fortunei*, 1. *Cistus ladaniferus*, 1. *Clematis Jackmanni*, 3. *Erica mediterranea*, the hard stems are split in every plant, their survival doubtful, 2. *Escallonia Ingrami*, 3; *E. macrantha*, 2. *Euonymus japonicus*, 2; *E. radicans*, 3. *Furze*, 2; *Do.*, fl. pl., 2. *Hydrangea arborescens*, 2; *H. Hortensia*, 3. *Holly*, variegated, 3. *Laurel*, Bay, in shady spots, cut down, 2, 3. *Laurel*, Portugal, 3. *Laurustinus*, in low places, 3; slightly touched in warm exposures. *Lavander*, 2. *Lonicera fragrantissima*, 2, 3. *Magnolia gr.*, 2, 3; *Do. Exm. var.*, 3. *Medlar*, 3. *Myrtle*, 1. *Narcissus polyanthus*, 3. *Olearia Haastii*, 3. *Pampas grass*, 1. *Passiflora cœrulea*, 1. *Penstemons*, 1. *Phormium tenax*, 1. *Picea lasiocarpa*, 3. *Plum*, golden drop, some old trees have suffered from frost and wet, 2, 3. *Quercus Ilex*, 3. *Rhododendrons*, the buds of early vars., with "arboreum blood," e.g. *R. Nobleanum* were killed; *R. precox*, *superbum*, 2, 3. *Rosemary*, 2. *Roses*, dwfs. 3; *H. P.'s*, 3; stands., 90 p. c., 1; *Tea*, 2. *Sequoia gigantea*, 3. *Stocks*, 2. *Strawberries*, vars. raised abroad, e.g. *Héricault de Thury*, *Grosseur sucré* suffered more than English kinds; of these, Frogmore late Pine showed the greatest susceptibility to frost. *Taxodium distichum*, 3. *Tritoma uvaria*, 3. *Veronica Andersoni*, 1; *V. Traver-*

si, 1. Vines, Black cluster, Hamburgh, Muscadine, 3. Walnuts, 3. Yew, wherever roots were flooded, 1.

Plants uninjured.—*Abies Douglasii*, *A. Morinda*, *Akebia quinata* (exposed), Almond, *Ampelopsis hederacea*, *A. Veitchii*, Apples, Apricots, *Aralia Sieboldii*, *Araucaria imbricata*, on dry slopes, 300 to 400 ft. *Aristolochia Siphon*, *Bambusa Fortunei*, *Benthamia fragifera*, *Berberidopsis corallina*, *Berberis japonica*, *B. vulgaris*, *Biota orientalis*, Broccoli (for amount *saved*, see above), Brussels sprouts, *Buxus balearica*, *B. sempervirens*, Cabbages, Carnations, Cauliflower, *Ceanothus americanus*, *C. grandiflorus*, *Cedrus Atlantica*, *Cephalotaxus Fortunei*, *Chamæcyparis sphæroidea*, Cherries, *Chimonanthus fragrans*, *Clematis montana*, *Colletia ferox*, *Cotoneaster microphylla*, *C. Simonsii*, *Crataegus oxyacantha*, fl. pl., *C. Pyracantha*, *Crytomeria elegans*, *C. japonica*, *Cupressus borealis*, *C. Lambertiana*, *C. Lawsoniana*, *C. macrocarpa*, *C. sempervirens*, *C. torulosa*, Currants, *Cytisus Laburnum*, *C. scoparius*, Do. fl. pl., *Daphne collina*, *D. indica*, *D. Laureola*, *D. Mezereum*, *Deutzia scabra*, *Elæagnus argentea*, Elm, Endive, *Eriobotrya japonica*, *Escallonia montevidensis*, *E. rubra*, *Euonymus europæus*, *Forsythia elegans*, *F. viridissima*, *Fremontia californica*, *Fuchsia coccinea*, *F. gracilis*, *F. macrostemma*, *F. Riccartoni*, *Genista racemosa*, *Gladiolus*, Gooseberries, *Halesia tetraptera*, *Hibiscus syriacus*, Holly, Do. variegated, Hyacinths, *Hydrangea japonica*, *H. Otaksa*, *Hypericum balearicum*, *H. Calycinum*, Iris, Ivy, *Jasminum nudiflorum*, *J. officinale*, *Juniperus*, Kale, *Kalmia latifolia*, *Kœlreuteria paniculata*, Larch, Laurels, common, round-leaved, *Colchica*, and *Caucasica*, *Lavatera arborea*, *Leptospermum lanigerum*, *L. scoparium*, Lettuce, *Libocedrus chilensis*, *L. viridis*, *L. decurrens*, *Ligustrum lucidum*, *L. vulgare*, Lilac, *Liquidambar styraciflua*, *Lobelia cardinalis* (Victoria, covered with light leaf soil), *Lonicera japonica*, *L. Periclymenum*, *Menziesia polifolia*, Mulberry, *Narcissus* (all but polyanthus), Nectarines, *Negundo fraxinifolia*, Oak, Winter Onions, *Osmanthus aquifolius*, *O. ilicifolius*, Parsley, *Paulownia imperialis*, Peaches (young vigorous trees of Barrington, Bellgarre, Hales' Early, Bellegarde, Royal George, Southampstead), Pears, *Phillyrea angustifolia*, *P. media*, *Photinia glabra*, *P. serrulata*, *Picea amabilis*, *P. cephalonica*, *P. grandis*, *P. Lowiana*, *P. Nordmanniana*, *P. pectinata*, *P. Pindrow*, *P. Pinsapo*, *Pinus excelsa*, *P. halepensis*, *P. insignis*, *P. Laricio*, *P. pinea*, *P. sylvestris*, Plane, Plums (all but Golden drop), *Podocarpus chinensis*, *Pyrus japonica*, *Quercus glabra*, *Q. Suber*,

Quince, *Raphiolepis ovata*, *Retinosporas*, *Rhus glabra*, *R. Typhina*, *Ribes*, *Ruscus aculeatus*, *Salisburia*, *Santolina chamæcyparis*, *Sequoia sempervirens*, *Skimmia japonica*, *Spartium junceum*, *Veronica salicifolia*, *Weigela rosea*, *Wistaria sinensis*, *Yucca aloifolia*, *Y. filamentosa*, *Y. gloriosa*.

2. LEICESTER, Barkby Hall.—Mr. J. Lansdell.

Gen. Char. of Soil—Light.

Alt. and Exposure—[212 ft.] Open on W. but protected on N.E. and S. by trees.

Rainfall, 1880—[Leicester, dist., 4 ms., S.W.; alt., 238 ft.; ht., 1 ft.; 35·14 ins., on 193 days].

Min. Temps. and Dates—[Wanlip, dist., 3 ms., W.; Jan. 15th, -4°; 16th, 0°; 17th, 4°; Loughborough, dist., 8 ms., N.W.; alt., 169 ft.; Jan. 15th, 16th, 1°·9].

Plants injured, 1880-81—18 (1), 21 (2), 2 (3)—Apricots, 1, 2. Artichoke, globe, kd. to grd., 2. *Aucuba japonica*, variegated, 1, 2. Borecole, nearly all, 1. Broccoli, Knight's protecting, 12 p.c., 1; Osborne's white, purple and white sprouting, Snow's white and Sutton's perfection, all, 1. Brussels sprouts, all, 1. Cabbage, old summer, all, 1. Celery, nearly all, 1. Clematis Jackmanni, 1, 2; *C. montana*, kd. to grd., 2. Endive, all, 1. *Fuchsia Riccartoni*, 2. Holly, 2, 3. *Hydrangea japonica*, 2. Ivy, 2. *Jasminum officinale*, 2. Laurel, Bay, 2. Laurel, common, 2; Do. Portugal, 2. Lavander, 1, 2. Lettuce, Tom Thumb, 2. *Lonicera fragrantissima*, 1, 2, 3. Penstemons, 2. Rosemary, 1. Roses, dwfs., 9 p. c., 1; all others, 2; stands., 60 p. c., 1; others, 2; Maréchal Niel, on wall, 1, 2. Stocks, 1. Wallflowers, 1. *Wistaria sinensis*, 2.

Plants uninjured—Broccoli, a dwarf kind, name unknown, not one lost. Lettuce, Bath cos, all stood well.

3. LEICESTER, Birstal Hill.—F. T. Mott, Esq., F.R.G.S.

Gen. Char. of Soil—[See p. 83].

Alt. and Exposure—[See p. 83].

Rainfall, 1880—[Leicester, dist., 3 ms.; alt., 238 ft.; 35·14 ins.].

Min. Temp. and Date—[Wanlip, dist., 1 m.; Jan. 15th, -4°.

Plants injured, 1880-81—9 (1), 13 (2), 10 (3)—*Ampelopsis Veitchii*, 3. *Aucuba japonica*, variegata, 2. *Berberis Darwinii*, 2. Broccoli, 1. Broom, newly planted, 1. Brussels sprouts, 2. Cauliflower, 1. Celery, 1. *Cercis siliquastrum* (newly planted), 1. *Cotoneaster microphylla*, 1879-80, 2; 1880-81, 1; *C. Simonsii*, 2.

Erica, 2. *Furze*, fl. pl., 1. *Holly*, 3. *Hydrangea Hortensia*, 2. *Ivy*, variegated, 3. *Jasminum officinale*, 3. *Laurel*, Bay, 1. *Laurel* common, 2; Do., *colchica*, 3; Do., Portugal, 3. *Leycesteria formosa*, 2. *Lonicera fragrantissima*, 3. *Phillyrea media*, 2. *Privet*, 3. *Quercus Ilex*, 2. *Roses*, dwfs., 2; stands., 2. *Salisbury*, 3. *Spartium junceum*, 1879-80, 2; 1880-81, 1. *Ulmus stricta*, 3.

Observations—Many shrubs kd. to the grd. during the preceding winter had put up fresh shoots, which never matured their wood; and these have been again destroyed. Bulbs do not appear to have suffered much. The superior hardiness of the Caucasian *Laurel* is very marked. The common *Laurel* is again kd. to the grd., as it was last year. *Laurel*, only half way down. The Caucasian *Laurel* is scarcely touched. *Laurustinus*, one or two survivors of last year appear to be quite killed. All the out-door Fruit trees appear to be uninjured, and show well for this year's crop.

4. LOUGHBOROUGH.—Mr. W. Tilleton.

Gen. Char. of Soil—Sandy gravel, medium and clay.

Alt. and Exposure—[Vict. St., 169 ft.].

Rainfall, 1880—32.75 ins., max., July, 5.38 ins., and Oct., 5.22; min., Jan., 0.29 ins.

Min. Temps. and Dates—[Alt., 169 ft.; Jan. 15th, 16th, 10.9].

Plants injured, 1880-81 — 26 (1), 28 (2), 17 (3)—*Almond*, 3. *Apples*, late, 3. *Araucaria imbricata*, 2, 3. *Arbutus Unedo*, 1, 2. *Artichoke*, globe, 2. *Aucuba japonica variegata*, 1, 2. *Berberis Darwinii*, 1. *Borecole*, 1. *Broccoli* (excepting those layered), 1. *Brussels sprouts*, 1. *Cabbages*, 2. *Carnations*, 1, 2, 3. *Cauliflower*, 1. *Cedrus Atlantica*, 3; *C. Deodara*, 1, 2; *C. Libani*, 3. *Celery*, 1. *Chimonanthus fragrans*, 2. *Clematis Jackmanni*, 3. *Cotoneaster Simonsii*, 2, 3. *Elm*, 3. *Garrya elliptica*, 1. *Gla-diolus*, 1. *Holly*, 1, 2; Do. variegated, 1, 2. *Ivy*, 2, 3. *Jasminum officinale*, 2. *Kale*, 1. *Laurel*, Bay, 1, 2. *Laurel*, common, 1, 2; L. Portugal, 1, 2. *Laurustinus*, 1. *Lavander*, 1, 2. *Nectarines*, 2, 3. *Onions*, winter, 2, 3. *Parsley*, 2, 3. *Pears*, 2, 3; late, 2. *Phillyrea angustifolia*, 1. *Privet*, 2, 3. *Quercus Ilex*, 1, 2. *Rosemary*, 1, 2. *Roses*, H. P.'s. 1, 2; stands. and Teas on briars, 1, 2. *Sequoia gigantea*, 3. *Wallflowers*, 1, 2. *Walnut*, 2. *Yew*, 3.

Observations—With regard to late Apples I attribute their injury to their not having ripened the wood of their late growth.

There is not a "specimen" plant of either *Arbutus*, Holly, common or Portugal Laurel now, in this neighbourhood. Hollies appear to have suffered, more especially on the N. side; as the wind was in that quarter during most of the winter.

1. LINCOLNSHIRE—HORNCastle, Hemingby Rectory.—Mr. E. S. Bengough.

Gen. Char. of Soil—A sandy loam and gravel; subsoil, mostly a white clay.

Alt. and Exposure—In a shallow valley of the Wolds, running N.N.W. and S.S.E.

Rainfall, 1880—[Horncastle, dist., 3 ms.; alt., 100 ft.; ht., 1 ft.; 34·01 ins.].

Date of Onset and Duration of Frost—Jan. 8th and 9th till 28th.

Min. Temps. and Dates—Jan. 14th and 15th, 2°·2 [Partney, dist., 11 ms., E.; Jan. 17th, 4°: Bucknall, dist., 6 ms., S.W.; alt., 100 ft.; Jan. 15th, 16th, 5°].

Plants injured, 1880-81—2 (1), 7 (2), 6 (3)—Artichoke, globe, 1, 2. *Berberis vulgaris*, 3. Brussels sprouts, laid, 2. Clematis Jackmanni, partly matted, 3. Ivy, 3. *Jasminum nudiflorum*, 3; *J. officinale*, 2. Laurel, common, 1, 2; *L. Portugal*, 2. Oak, 2, 3. Yew, 2; *Do. fastigiata*, 2.

2. SLEAFORD, Bloxholm.—Mr. D. Lumsden.

Gen. Char. of Soil—Calcareous.

Alt. and Exposure—20 ft.; not exposed, but suffer much from late spring frosts.

Rainfall, 1880—32·59 ins., on 130 days.

Date of Onset and Duration of Frost—Dec. 15th, and continued more or less to end of Feb.

Min. Temps. and Dates—Jan. 15th, 0°; 17th, 5°; 21st, 3°; 18th and 22nd, 8°: [Boston, dist., 15 ms., E.; alt., 24 ft.; Jan. 15th, 2°].

Plants injured, 1880-81—35 (1), 24 (2), 20 (3)—*Abies Morinda*, 2. Almond, 3. *Aloysia citriodora*, 1. *Ampelopsis Veitchii*, 3. Apples, various sorts, many, 1, 3. Apricots, 2. *Araucaria imbricata*, 1. *Arbutus Unedo*, 1. Artichoke, globe, 2. *Arundo conspicua*, 1. *Aucuba japonica*, 2; *Do. variegata*, 2. *Biota orientalis*, 3. Borecole, 2. Broccoli, 2. *Brugmansia sanguinea*, 1. Brussels

sprouts, 2. Cabbages, 2. Cauliflower, 2. Cedrus Deodara, 2; C. Libani, 3. Celery, 2. Chimonanthus fragrans, 3. Clematis Jackmanni, 1. Clianthus puniceus, 1. Coronilla glauca, 1. Cryptomeria elegans, 2; C. japonica, 3. Cupressus torulosa, 1. Deutzia scabra, 3. Dracaena australis, 1. Echeveria metallica, 2. Endive, 2. Eugenia Ugni, 1. Euonymus japonicus, 2. Fabiana imbricata, 1. Fuchsia Riccartoni, 2. Furze, 3. Garrya elliptica, 1. Holly, 2; Do. variegated, 2. Hydrangea japonica, 1. Ivy, 2; Do. variegated, 2. Kale, 2. Laurel, Bay, 1. Laurel, common, round-leaved, colchica and caucasica, all, 1; L. Portugal, 1. Laurustinus, 1. Lavander, 1. Lettuce, 1. Libocedrus chilensis, 1. Lonicera fragrantissima, 3; L. japonica, 3. Magnolia grandiflora, 1. Myrtle, 1. Nectarines, 3. Onions, winter, 3. Pampas grass, 1. Passiflora cœrulea, 1. Parsley, 3. Peaches, 3. Pears, 3. Phillyrea angustifolia, 1; P. media, 1. Phormium tenax, 1. Plums, suffered more than any other fruits, spurs being nearly all dead to the branches, 2. Quercus Ilex, 1; Q. robur, 1; Q. Suber, 1. Rosemary, 1. Roses, stands., 1; Tea, 1. Sequoia gigantea, 3; S. sempervirens, 3. Stocks, 1. Strawberries, 3. Tritoma uvaria, 2. Veronica Andersoni, 1. Wallflowers, 1. Wistaria sinensis, 3. Yucca aloifolia, 3.

Observations—Our losses have again been great this year, with no survivals. In fact, the destructive effects of the winter 1879-80 have been continued all through the subsequent seasons. Specimen Box trees appear to have been affected in the same way. Aucubas of all vars., Laurels, Bay, common and Portugal, and Laurustinus, that were not killed in 1879, made an effort to grow; but now all the young shoots are killed to the ground. Many fine specimens of Yews have been going off and are still dying in numbers all over the estate.

1. RUTLAND—OAKHAM, Burley-on-the-Hill.—Mr. W. Temple.

Gen. Char. of Soil—Strong and retentive.

Alt. and Exposure—High, on the side of a hill.

Rainfall, 1880—34·87 ins. (or 6·41 ins. above that of 1879). Greatest fall in 24 hours, 1·56 ins., July 15th. Number of rainy days, 165; greatest number of rainy days in one month (July), 25.

Date of Onset and Duration of Frost—Oct. 10th, 1880, 31°, till May 11th, 1881, 25°.

Min. Temp. and Date—Jan. 29th, 12°.

Plants injured, 1880-81—1 (1), 10 (2), 12 (3)—*Arbutus Unedo*, 2. *Artichoke*, globe, 2. *Aucuba japonica*, 3. *Bambusa Fortunei*, 3. *Berberis japonica*, 2. *Broccoli*, 2. *Cabbages*, 3. *Cauliflower*, London, 3. *Celery*, 3. *Echeveria metallica*, 3. *Endive*, 3. *Euonymus japonicus*, 2; *E. radicans*, 2. *Laurel*, Bay, 2. *Laurel*, common, 3; *Do. Portugal*, 3. *Laurustinus*, 2. *Lettuce*, 2. *Magnolia grandiflora*, 2. *Parsley*, 3. *Roses*, H. P.'s, 3; *Teas on briar*, 1. *Wistaria sinensis*, 3.

Observations—Out of 2400 *Broccolis*, 200 were saved; *viz.* *Cattell's Eclipse* and *Osborne's Dwarf*, planted in a solid piece of ground, after *Strawberries*. Seven sorts were completely destroyed.

DIVISION VIII.—N. W. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN.
1881, FROM CHESHIRE AND LANCASHIRE.

CHESHIRE. *Rainfall*, excessive in last 7 months (Pulford, Chelford), total 3·2 ins. above av. of 12 yrs. (Northwich). Do. 9 p. c. above. av. of 18 yrs. (Hinderton). Min. rainfall, Chester (Shot Tower), alt., 227 ft.; ht., 160 ft.; 21·90 ins.: max., Woodhead Res., alt., 680 ft.; ht., 10 ins.; 56·97 ins. *Min. temps.*, Cholmondeley Castle, alt., 42 ft.; Jan. 16th, -4°: Hinderton, alt., 218 ft.; Jan. 16th, 0°·1: Chester, alt., 64 ft.; Jan. 16th, 0°·8: Bidstone, alt., 180 ft.; Jan. 26th, 9°.

Plants injured, 1880-81 — 82 (1), 98 (2), 76 (3), total at 4 places.

LANCASHIRE. First part of yr. dry; latter, very wet (Liverpool and especially S.W. Lancashire). *Rainfall*, several ins. above that of 1879; but, better sum. and more sunshine (Manchester). Do., 2·04 ins. above av. of 10 yrs. (Rufford). Do., 3·87 ins. below av. of 49 yrs. (Bolton). Min. rainfall, Barrow-in-Furness, alt., 60 ft.; ht., 1 ft.; 30·65 ins., on 176 days: max., Bridge End, alt., 385 ft.; ht., 9 ins.; 95·18 ins., on 185 days. Jan. 1881, frost began on 5th and continued till 27th; Coniston Lake only frozen at the upper end. *Min. temps.*, on Jan. 16th, St. Michael-on-Wyre, alt., 26 ft.; Jan. 10th, -7°·5: Broughton-in-Furness, alt., 112 ft.; -5°: Garstang, alt., 55 ft.; -4°: Blackpool, ht., 30 ft.; -0°·5: Chorley, alt., 187 ft.; 0°: Liverpool, alt., 123 ft.; 4°: and Blackburn, alt., 515 ft.; 6°·4: Holker Hall, alt., 100 ft.; Jan. 15th, 25th, 8°.

Plants injured, 1880-81 — 47 (1), 54 (2), 28 (3), total at 3 places.

REPORTS.

1. CHESHIRE—MANCHESTER, Cheadle.—Mr. R. MacKillar.

Gen. Char. of Soil—A brown loam; in some cases resting on gravel.

Alt. and Exposure—Low and sheltered.

Rainfall, 1880—34·24 ins.

Date of Onset and Duration of Frost—Jan. 1st, and continued during the month. Temp. below freezing for three weeks.

Min. Temps. and Dates—[Manchester, dist., 6 ms., N.; alt., 104 ft.; Jan. 17th, 26th, 10°].

Plants injured, 1880-81—17 (1), 15 (2), 5 (3)—*Arbutus Andrachne*, 1. Box, many, 1. *Cedrus Deodara*, a large number, 1, 2. *Cupressus Lawsoniana*, tips browned, 3. Hollies, killed in parts, especially where overshadowed by trees, 3. *Hibiscus syriacus*, 2. Laurel, Bay, on wall, 2; L. Portugal, quite brown, 2. *Liquidambar*, 2. *Lithosporum fruticosum*, and Pampas grass, in 1878-9, 1. *Picea cephalonica*, 2; Strawberries, many plants, 1; Black prince worst. *Sequoia sempervirens*, 1.

Plants uninjured—Almond, *Ampelopsis Veitchii*, *Berberis aquifolia*, *Castanea vesca*, *Cedrus Atlantica*, *C. Libani*, *Clematis Jackmanii*, *Cotoneaster Simonsii*, *Cratægus Pyracantha*, *Cupressus borealis*, *Kalmia latifolia*, *Lilium lancifolium*, *Pinus excelsa*, *Pyrus japonica*, *Retinospora plumosa aurea*, *Rhododendrons*, *Skimmia japonica*, *Wistaria sinensis*.

2. NANTWICH, Cholmondeley Castle.—Mr. T. Malcolm.

Gen. Char. of Soil—The upper part of the garden is a light loam, the lower being on clay.

Alt. and Exposure—42 ft.; kitchen garden, low and damp, subject to late spring frosts.

Rainfall, 1880—41·02 ins.: max., July, 7·98 ins.: min., March, 1·12 ins.

Date of Onset and Duration of Frost—Nov. 15th to 25th; temp. on 21st being 10°; several frosty nights in Dec.; but generally mild.

Min. Temps. and Dates—Jan. 12th, 5°; 13th, 8°; 14th and 21st, 3°; 15th, -1°; 16th, -4°; 17th, 22nd, 1°; 20th, 2°.

Plants injured, 1880-81—17 (1), 40 (2), 22 (3)—*Abies Morinda*, 3. *Azalea indica*, 3. *Berberis japonica*, 3. *Biota orientalis*, 3. *Ceanothus azureus*, 2. *Cedrus Atlantica*, 2; *C. Deodara*, 2; *C. Libani*, 3. *Chimonanthus fragrans*, 3. *Clematis Jackmanni*, 2. *Cryptomeria elegans*, 2; *C. japonica*, 3. *Cupressus macrocarpa*, 3. *Echeveria metallica*, 2; *E. radicans*, 2. *Forsythia elegans*, 3. *Fuchsia Riccartoni*, kd. to grd., 2. (Hydrangeas cannot survive the winters here.) *Ivy*, 2. *Ligustrum lucidum*, 1. *Osmanthus ilicifolius*, 2. *Picea cephalonica*, 3; *P. grandis*, 3; *P. lasiocarpa*, 3; *P. Lowiana*, 2. *Pinus Laricio*, 2; *P. sylvestris*, 2. *Pyrus japonica*, 3. *Roses*, dwfs., 2; *H. P.'s*, 2; *Teas*, 1. *Salisburia*, 2. *Santolina chamæcypariss*, 2. *Veronica salicifolia*, 2.

Observations—Apple trees, those which suffered most were D. T. Fish, Lord Burghley, Lord Suffield and Ribston Pippin. Apricot trees are nearly all killed, particularly Moorpark; while young trees have also suffered. Bay Laurels or Sweet Bays were killed to the ground two years ago, and last year the roots were all killed. Common Laurel, for which this place is famed, has suffered dreadfully; old plants are killed to the ground, and in some exposed places nearly every leaf is dead. Nectarines, all are more or less injured but none killed. Peach trees, on walls outside, are badly injured; such as Dagmar, Dymond and Lord Palmerston, while Alexander Noblesse, Dr. Hogg and Early Beatrice are killed. Vegetables, Broccolis, though taken up in the autumn and laid in, were nearly all killed, and all equally, except a few of Surprise. Brussels sprouts were all killed. Strawberries, nearly all the Sir C. Napier were killed; but other sorts appear to be uninjured.

3. NANTWICH, Poole Hall.—Mr. W. Smith.

Gen. Char. of Soil—Of a medium texture; on Red Sandstone formation and well drained.

Rainfall, 1880 — [Cholmondeley Castle, dist., 6 ms., W.; alt., 42 ft.; 41·02 ins.].

Min. Temp. and Date—[Cholmondeley, Jan. 16th, -4°].

Plants injured, 1880-81—31 (1), 20 (2), 19 (3)—*Abies Morinda*, 1. Apples [see below], 2. *Berberidopsis corallina*, 1. *Berberis japonica*, 3. *Ceanothus dentatus*, 1. *Chimonanthus fragrans*, 1. *Clematis Jackmanni*, 2; Do. "Miss Bateman," 1. *Cryptomeria elegans*, 3; *C. japonica*, 3. Currants, white and black, 2. *Erica stricta*, 1; *E. mediterranea*, 1. *Euonymus europæus*, 1; *E. radi-*

cans, 3. Forsythia viridissima, 3. Fuchsia gracilis, 1; F. Riccartoni, 1. Gunnera scabra, 1. Libocedrus viridis, 3. Lonicera japonica, 2. Narcissus, polyanthus, 1. Penstemons, 1. Picea Nordmanniana, 3; P. Pindrow, 3; Pinus sylvestris, 3. Roses, stands. 1, 2; Tea, 2; Maréchal Niel, 1. Sequoia sempervirens, 3. Veronica Traversi, 1. Walnut, 3. Yucca aloifolia, 2; Y. gloriosa, 3.

Observations—Apple trees, Blenheim Orange, Calville Blanche d'hiver, Cox's Orange Pippin, Dutch Codlin and Northern Spy have suffered most, especially in the top of the trees, the injury sometimes extending into the wood of three years growth. Many others are injured but in the form of canker. Pear trees have not suffered so much as Apples; Doyenné du Comice is the only one much injured. The Jargonelle is the healthiest and most promising we have. Plums, Jefferson, lost its young wood.

4. WARRINGTON, Walton Lea.—Mr. W. Kippes.

Gen. Char. of Soil—A light loam on Red Sandstone rock; heavy loam on clay; bog well drained.

Alt. and Exposure—Situated high on N. and W.; sheltered only S.W. by a plantation.

Rainfall, 1880—[Liverpool, dist., 14 ms., W.; alt., 160 ft.; 33·20 ins., on 151 days].

Min. Temps. and Dates—[Liverpool, alt., 119 ft.; Jan. 16th, 4°; Manchester, dist., 14 ms., E.; alt., 149 ft.; Jan. 17th, 26th, 10°].

Plants injured, 1880-81—17 (1), 23 (2), 30 (3)—Ampelopsis Veitchii, 2. Aucuba japonica variegata, 2. Catalpa syriaca, 1. Cotoneaster Simonsii, 3. Crataegus pyracantha, 3. Cryptomeria japonica, 3. Cupressus Lawsoniana, 3; C. macrocarpa, 3. Hyacinths, 3. Jasminum nudiflorum, 3. Ligustrum lucidum, 2. Menziesia polifolia, 3. Mulberry, 3. Phillyrea angustifolia, 1. Picea amabilis, 3; P. grandis, 3; P. lasiocarpa, 3; P. Pinsapo, 3. Quercus glabra, 2. Roses, H. P.'s, 2; stands., 2; Tea, 2 [see below]. Skimmia japonica, 3. Taxodium distichum, 2. Walnut, 3. Yucca aloifolia, 2.

Observations—The foliage of the majority of the Evergreen plants has been injured. The strong East winds in January carried the frozen snow, sand and soil a very long distance. This is what I believe did a great deal of injury to most things. Hollies and Rhododendrons are very fine here and are not very much injured. A general complaint about this part of the country has

been of the *Asparagus* failing for the last three years. In the Rose garden here (in beds on the grass) there are the following damages, on seedling Briars—Alfred Colomb, 3; Baroness Rothschild, 2; Captain Christy, 2; Charles Lefebvre, 3; Citienne Levet, 3; Fraçoise Michelin, 3; Général Jacqueminot, 3; Horace Vernet, 2; John Hopper, 3; La France, 2; Louis Van Houtte, 2. Marie Bauman, 2; Marquise de Castellaine, 3; Sénateur Vaisse, 3.

1. LANCASHIRE—CARTMEL, Holker Hall.—Mr. W. Fox.

Gen. Char. of Soil—Light and open; very stony upon a rocky subsoil.

Alt. and Exposure—100 ft.; open to sea on S. and W.; tides within three-quarters of a mile.

Rainfall, 1880—39·46 ins.

Date of Onset and Duration of Frost—Frost between 18th and 31st of Oct., 10 nights; Nov. 1st and 22nd, 15 nights; in Dec., 19 nights; Jan. 4th to 26th. In Feb., 20 nights; and in March 18 nights.

Min. Temps. and Dates—Oct. 21st, 20°; Nov. 20th, 19°; Dec. 30th, 20°; Jan. 15th and 25th, 8°; Feb. 28th, 19°; March 1st and 29th, 17°.

Plants injured, 1880-81 — 9 (1), 22 (2), 6 (3)—*Arundo Donax*, 1. *Catalpa syringæfolia*, 2. *Desfontainea spinosa*, 1. *Elæagnus argentea*, 1. *Erica mediterranea*, 2. *Eugenia Ugni*, 1. *Griselinia littoralis*, 2. *Hydrangea quercifolia*, 2. *Leptospermum lanigerum*, 2. *Ligustrum lucidum*, 2. *Lonicera japonica*, 2. *Paulownia imperialis*, 3. Peaches, Bellegarde, 3. *Photinia serrulata*, 2. *Quercus glabra* (very exposed), 2. *Rhododendrons*, scarlet hyb., 2. Roses, stands. on common briar, 2. *Taxodium distichum*, 2.

Plants uninjured—*Abies Morinda*, *Ampelopsis Veitchii*, *Biota or.*, *Cephalotaxus Fortunei* (sheltered), *Cercis siliquastrum*, *Chimonanthus fragrans*, *Clematis Jackmanni*, *C. montana*, *Cotoneaster microphylla*, *C. Simonsii*, *Cryptomeria elegans*, *C. japonica*, *Cupressus borealis*, *C. Lambertiana*, *C. Lawsoniana*, *C. macrocarpa*, *Deutzia scabra*, *Fitzroya patagonica*, *Forsythia viridissima*, *Fuchsia Riccartoni*, *Halesia tetraptera*, *Hibiscus syriacus*, *Jasminum nudiflorum*, *Juglans regia*, *Kalmia latifolia*, *Leycesteria formosa*, *Liquidambar styraciflua*, *Picea cephalonica*, *P. grandis*, *P. Nordmanniana*, *P. Pinsapo*, *Pinus excelsa*, *Pyrus japonica*, *Retinospora*, Roses, dwfs.

on Manetti, Salisburia, Sequoia, Skimmia japonica, Weigela rosea.

2. LYTHAM.—Mr. R. Maries.

Gen. Char. of Soil—Sand and a sandy loam.

Alt. and Exposure—About 35 ft.; exposed from E. to W.

Rainfall, 1880—[Blackpool, dist., 6 ms.; alt., 29 ft.; 34·72 ins.].

Min. Temps. and Dates—Jan. 15th, 21st and 22nd, 19°; 16th, 13°; 20th, 17°; 26th, 16°.

Plants injured, 1880-81 — 21 (1), 27 (2), 14 (3)—Almond, 3. Aucuba japonica, male, 1; Do. variegata, 2. Azalea amæna, 2. Bambusa Fortunei, 3. Berberis japonica, 3. Clematis Jackmanni, 3. Hydrangea arborescens, 2; H. Hortensia, 2; H. japonica, 2; H. Otaksa, 2. Hypericum Calycinum, 3. Jasminum nudiflorum, 3. Laurel, common, 1; Do. round-leaved, Colchica and Caucasica, 2. Ligustrum ovalifolium, 2. Lilium auratum, 3. Magnolia grandiflora, Exmouth var., 2. Olearia Haastii, 3. Rhododendron ponticum and hybs., 3. Roses, dwfs., 2; H. P.'s on briar and Manetti, 2; stands., 1; Tea, 2. Salisburia, 3. Spartium junceum, 2. Thuja aurea, 2.

Plants uninjured—Ampelopsis Veitchii, Biota orientalis, Cotonæster microphylla, C. Simonsii, Cratægus Pyracantha, Cryptomeria elegans, C. japonica, Cupressus borealis, C. Lawsoniana, C. macrocarpa, Deutzia scabra, D. gracilis, Euonymus radicans variegata, Forsythia elegans, F. viridissima, Fuchsia Riccartoni, Gladiolus Colvillei, albus and byzantinus, Iris, Kalmia latifolia, Lilium excelsum, L. lancifolium, Pyrus japonica, Retinospora (many vars.), Skimmia japonica, Wistaria sinensis.

Observations—Plants upon the whole have not suffered as in the previous winter. I never saw bloom so abundant and fine as it is this year, on Apples, Pears, Cherries, Lilac, Laburnum, Mountain Ash, and most other flowering trees and shrubs; though scarce on Plums. Herbaceous plants have come up strong; including many sorts of Lilies, *e.g.* L. Californicum, which I never saw so fine before.

DIVISION IX.—YORKSHIRE.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881,
FROM YORKSHIRE.

WEST RIDING. The wettest of the last 25 yrs. (Wath-upon-Dearne). *Rainfall*, 4·37 ins. above av. of 15 yrs. (Huddersfield). Do., 7·4 ins. above av. (Wakefield). Do., heavier than of 1879, but with more sun (Bradford). On the whole a pleasant moderate yr. Frost, Oct. 3rd, killed all half-hardy plants (Sedbergh, Thorn). *Min. rainfall*, Wetherby (Ribston), alt., 130 ft.; ht., 1 ft. 2 ins.; 29·68 ins.: max., Slaidburn (Hareden Brook), alt., 540 ft.; ht., 1 ft. 2 ins.; 67·34 ins. Jan. 1881, frost from 6th to 26th, with biting E. wind on 18th (Stanley Vic.). *Min. temps.*, Sedbergh, Jan. 16th, -6°: Arncliffe, alt., 220 ft.; Jan. 25th, -2°: Ribston Hall, alt., 130 ft.; Jan. [15th?], -1°: Conyngham Hall, Jan. 17th, 2°: Sheffield, alt., 260 ft.; Jan. 16th, 3°: Stanley Vic., alt., 100 ft.; Jan. 15th, 9°: Halifax, alt., 500 ft.; Jan. 16th, 20th, 10°: Bradford, alt., 362 ft.; and Leeds, alt., 137 ft.; Jan. 26th, 12°.

Plants injured, 1880-81 — 51 (1), 61 (2), 43 (3), total at 3 places.

EAST RIDING. A very wet year: max. temp. never reached 80°, till Sept. 3rd, 84°·5; first frost, Oct. 20th, 26° (nr. Hull). *Min. rainfall*, Spurn Head, alt., 27 ft.; ht., 1 ft.; 24·23 ins., on 173 days: max., Wold Newton Vic., alt. 195 ft.; ht., 1 ft. 6 ins.; 47·89 ins., on 168 days. *Min. temps.*, Dalton Hall, alt., 154 ft.; Jan. 18th, 22nd, 6°: Spurn Head, alt., 28 ft.; Jan. 18th, 19°.

Plants injured, 1880-81 — 14 (1), 22 (2), 22 (3), total at 1 place.

NORTH RIDING. *Rainfall*, 2·59 ins. above av. of 22 yrs. (Old Malton). Do., heaviest recorded (Port Mulgrave). *Min. rainfall*, Middlesborough, alt., 21 ft.; 28·38 ins., on 144 days: max., Hawes (Lunds), alt., 1100 ft.; ht., 1 ft.; 61·45 ins., on 223 days. Jan. 1881, coldest month since 1866, mean temp., 6°·4 below av. (Scar-

borough). *Min. temps.*, Sorrel Sykes,* Jan. 26th, -9° : Ripon, Jan. 17, -3° : Aysgarth, alt., 660 ft.; Jan. 26th, $-2^{\circ}8$: Whorlton, alt., 142 ft.; Jan. 26th, -1° : Whitewell Hall, alt., 280 ft.: and York, alt., 55 ft.; Jan. 15th, 1° : East Layton, alt., 113 ft.; Jan. 25th, 1° : Scarborough, alt., 161 ft.; Jan. 26th, $7^{\circ}7$.

Plants injured, 1880-81 — 23 (1), 23 (2), 17 (3), total at 3 places.

REPORTS.

1. W. RIDING—CLITHEROE, Bolton-by-Bowland. — Mr. R. Milne-Redhead. [See p. 97].

Gen. Char. of Soil—A calcareous loam.

Alt. and Exposure—About 450 ft.; S.E. to W.

Rainfall, 1880—[Clitheroe, dist., 7 ms., S.W.; alt., 454 ft.; 45·89 ins.].

Plants injured, 1880-81—17 (1), 5 (2), 8 (3)—*Aralia Sieboldii*, 1. *Arbutus Andrachne*, 1. *Biota orientalis*, 3. *Buddleia globosa*, 1. *Cedrus Atlantica*, 3; *C. Deodara*, 3. *Cryptomeria elegans*, 2. *Cupressus macrocarpa*, 1. *Hibiscus syriacus*, 1. *Pinus insignis*, 1. *Plane*, 3. *Quercus Suber*, 1.

Plants uninjured—*Ampelopsis hederacea*, *A. Veitchii*, *Bambusa Fortunei*, *Carnations*, *Cedrus Libani*, *Cephalotaxus Fortunei*, *Chamaecyparis sphaeroidea*, *Clematis Jackmanni*, *Cotoneaster microphylla*, *C. Pyracantha*, *Cryptomeria japonica*, *Cupressus Lawsoniana*, *Fuchsia coccinea*, *Halesia tetraptera*, *Iris*, *Kalmia latifolia*, *Common Laurel*, *Do. round-leaved*, *D. Colchica*, *Do. Caucasica*, *Lonicera fragrantissima*, *L. japonica*, *Menziesia polifolia*, *Narcissus*, *Osmanthus aquifolius*, *O. ilicifolius*, *Picea amabilis*, *P. Cephalonica*, *P. grandis*, *P. lasiocarpa*, *P. Lowiana*, *P. Nordmanniana*, *P. Pinsapo*, *Retinospora filicoides*, *R. obtusa*, *R. plumosa*, *R. do. aurea*, *R. squarrosa*, *Salisburia*.

2. KNARESBOROUGH, Conyngham Hall. — B. T. Woodd, Esq. [p. 98].

* *Qr. Jl. of Met. Soc.* (Ap. 1881), p. 147 [presumably in N. Riding, but not stated].

Gen. Char. of Soil—A strongish loam.

Alt. and Exposure—150 to 200 ft.; sheltered for N. and E.; open to S. and W.

Date of Onset and Duration of Frost—Oct. 20th, 23°; from Jan. 7th to March 6th; March 31st, 19°.

Min. Temp. and Date—Jan. 17th, 2°.

Plants injured, 1880-81—8 (1), 18 (2), 17 (3)—*Abies Morinda*, 2. *Berberis japonica*, 3. Broccoli, Backhouse's Winter White, Handsworth White, Hill's June, Snow's Winter White, all, 1. Carnations, 3. *Cedrus Libani*, 3. *Cryptomeria elegans*, 3. *Cupressus sempervirens*, 1. *Echeveria metallica*, 1. *Euonymus europæus*, 1. *Fuchsia coccinea*, 3. *Lonicera japonica*, 2. *Phillyrea angustifolia*, 2. *Picea Pinsapo*, 3. *Pinus insignis*, 1. *Pyrus japonica*, 3. Roses, stands., 3. *Ruscus aculeatus*, 2. *Sequoia sempervirens*, 3. *Wistaria sinensis*, 3.

Plants uninjured — *Abies Douglasii*, Almond, *Ampelopsis hederaea*, *A. Veitchii*, *Biota orientalis*, *Buxus balearica*, Cauliflower, *Cedrus Atlantica*, *C. Deodara*, *C. Libani*, *Chimonanthus fragrans*, *Clematis Jackmanni*, *Cotoneaster microphylla*, *C. Simonsii*, *Cratægus Pyracantha*, *Cryptomeria japonica*, *Cupressus borealis*, *C. Lawsoniana*, *C. macrocarpa*, *C. torulosa*, *Dahlia variabilis*, *Daphne indica*, *Deutzia scabra*, *Eriobotrya japonica* (planted in open, from house, Oct.), *Fitzroya patagonica*, *Forsythia elegans*, *F. viridissima*, *Genista racemosa*, *Gladiolus*, *Hibiscus syriacus*, Hyacinths, *Hypericum balearicum*, *Jasminum nudiflorum*, *Kalmia latifolia*, Lettuces, Bath Cos, Black seeded, White seeded, Hammersmith hardy green, all did well; *Ligustrum lucidum*, *Lonicera fragrantissima*, *Narcissus*, Winter Onions, Penstemons, *Picea Nordmanniana*, *P. pectinata*, *Pinus Laricio*, *Quercus glabra*, *Retinospora*, *Rhododendrons*, Roses, dwfs., H. P.'s, and Teas, *Sequoia gigantea*, *Tritoma uvaria*, Vines, *Weigela rosea*, *Yucca aloifolia*.

3. WETHERBY, Ribston Hall.—Mr. T. Jones. [See p. 99].

Gen. Char. of Soil—Light and calcareous.

Alt. and Exposure—130 ft.; aspect S.

Rainfall, 1880—29.68 ins.

Min. Temps. and Dates—[Jan. 15th ?], -1°: [York, dist., 12 ms., E.; Jan. 15th, 1°].

Plants injured, 1880-81—26 (1), 38 (2), 18 (3)—*Abies Morinda*, 3. *Ampelopsis Veitchii*, 3. *Bambusa Fortunei*, 2. *Berberis*

japonica, 2. Buddleia globosa, 1. Ceanothus americanus, 2; C. azureus, 2. Clematis Jackmanni, 3; C. montana, 2. Cotoneaster Simonsii, 3. Crataegus Pyracantha, 2. Cryptomeria elegans, 1. Cupressus Lambertiana, 1; C. macrocarpa, 1. Daphne Mezereum, 3. Deutzia scabra, 3. Echeveria metallica, 1. Forsythia viridissima, 2. Fuchsia Riccartoni, 1. Hydrangea japonica, 2. Jasminum nudiflorum, 2. Laurel, common, 2; Do. colchica, 2. Ligustrum lucidum, 1; L. vulgare, 2. Lilium auratum, 2; L. excelsum, 2; L. lancifolium, 2. Lonicera fragrantissima, 1; L. Periclymenum, 3. Mulberry, 2. Onions, winter, 3. Picea lasiocarpa, 3; P. Nordmanniana, 3; P. Pinsapo, 2. Pinus excelsa, 2; P. insignis, 1. Roses, dwfs., 3; H. P.'s, 2; stands., 1; Tea, 1. Santolina chamæcyparis, 1. Veronica Andersoni, 3. Weigela rosea, 2.

1. E. RIDING, Boynton; and N. RIDING, Hildenley.—C. W. Strickland, Esq.

Gen. Char. of Soil and Alt., &c.—[See p. 99].

Rainfall, 1880—[Foxholes Rec., alt., 234 ft.; 41·42 ins., on 197 days].

Min. Temp. and Date—[Scarborough, dist. 14? ms.; alt., 161 ft.; Jan. 26th, 70·7].

Plants injured, 1880-81—6 (1), 7 (2), 10 (3)—Chamærops Fortunei, 2. Cryptomeria elegans, 3; Cupressus Lambertiana, 1, 2. Hypericum Calycinum, 3. Jasminum officinale, 1, 2. Leycesteria formosa, 3. Lonicera fragrantissima, 2. Mulberry, 3. Oaks, 1, 3. Plane, 3. Sequoia sempervirens, 3. Yucca baccata, 1.

Plants uninjured—Abies Douglasii, A. Morinda, Ampelopsis Veitchii, Apricots, Arundo conspicua, Berberis asiatica, B. dulcis, B. empetrifolia, B. vulgaris, Carnations, Castanea vesca, Cedrus Atlantica, C. Libani, Cephalotaxus Fortunei, Clematis Jackmanni, C. montana &c., Cotoneaster microphylla, C. Simonsii, Crataegus Pyracantha, Cryptomeria japonica, Cupressus borealis, C. Lawsoniana, Escallonia macrantha, Euonymus latifolius, Fraxinus mandshuriensis, F. Ornus, Juniperus chinensis, Koeleria paniculata, Libocedrus decurrens, Medlar, Narcissus, Negundo fraxinifolia, Osmanthus ilicifolius, Picea cephalonica, P. grandis, P. lasiocarpa, P. Lowiana, P. Nordmanniana, P. pectinata, P. Pindrow, P. Pinsapo, Pinus excelsa, P. Laricio, Pyrus japonica, Retinospora obtusa, R. pisifera, R. plumosa, Rhus Typhina, Salisburia, Sequoia gigantea,

Thuja gigantea, *T. Verveana*, *Thujopsis dolabrata*, *Tritoma uvaria*, *Weigela rosea*, *Wistaria sinensis*, *Yucca flaccida*.

Observations—*Ampelopsis Veitchii*, at Boynton, on E. wall, frequently injured; on W. wall, a few yards distant, uninjured. *Aralia* (*Dimorphanthus*) *mandshuricus* seems perfectly hardy. *Araucaria imbricata*, generally uninjured, 1879-80 and 1880-81; it is usually injured on a dry soil and situation. *Cupressus Lambertiana* and *C. macrocarpa* are often injured by a hard winter. *Escallonia macrantha* is perfectly hardy near the E. coast, but quite tender, inland. *Kœlreuteria paniculata* is generally injured, but never killed at Hildenley. Larches have been injured and killed very extensively in the neighbourhood of Pickering, chiefly, I believe, by winter 1879-80. *Osmanthus ilicifolius* is hardy near the sea but not so inland. *Pinus Laricio* is generally unhurt; but two or three at Boynton are killed or nearly so. Lombardy poplars were, I believe, unhurt by the winter of 1879-80, but 90 p. c. all over the country were killed, 1880-81. *Quercus Ilex*, is perfectly hardy by the sea, but not so inland. Oaks, great numbers were killed or nearly so, 1879-80; but were uninjured, 1880-81. Those not quite killed, 1879-80, are now recovering. *Retinosporas* (see above) were unhurt at Boynton, but do not grow healthily there. Yews, many killed or severely injured, 1879-80, both at Boynton and Hildenley; but were quite uninjured, 1880-81.

2. MARKET WRIGHTON, Dalton Hall.—Mr. J. Allsopp.

Gen. Char. of Soil; Alt. &c. [See p. 101].

Rainfall, 1880—[Middleton-in-the-Wolds, dist., 4 ms.; alt., 150 ft.; 33·79 ins., on 148 days].

Min. Temps. and Dates—Jan. 18th, 22nd, 6°; 26th, 11°.

Plants injured, 1880-81 — 14 (1), 22 (2), 22 (3)—*Aralia Sieboldii*, 1. *Asparagus*, by wet and cold, 3. *Azalea amœna*, 1. *Berberis japonica*, 3. *Biota orientalis*, 2. Broccoli, Cattell's eclipse, Cooling's matchless, Dilcock's bride, Early purple cape, Leamington, Model, Snow's superb winter white, Veitch's fine spring white, Veitch's self-protecting, all, 1. *Clematis montana*, 1. *Cotoneaster elegans*, 3. *Euonymus radicans*, 3. *Hydrangea Hortensia*, 1; *H. japonica*, 2. *Magnolia grandiflora*, Exmouth var., 1. *Negundo fraxinifolia*, 2. *Osmanthus ilicifolius*, 2. *Picea amabilis*, 3; *P. lasiocarpa*, 3; *P. Lowiana*, 3; *P. Pinsapo*, 2. *Rhus glabra*, 2. Roses, Tea, on briars, 1; Do. on own roots, cut to grd., 2. *Skimmia japonica*, 2. *Taxodium distichum*, 3. *Yucca filamentosa*, 2.

1. N. RIDING—YORK, Benningbrough Hall.—Mr. A. Foster.

Gen. Char. of Soil—Alluvial on clay [see p. 103].

Alt. and Exposure—About 50 ? ft. ; on bank of Ouse.

Rainfall, 1880—[York, dist., 6 ms., E. ; alt., 53 ft. ; 30·93 ins., on 179 days].

Date of Onset and Duration of Frost—Oct. 20th, 24°.

Min. Temp. and Date—Jan. 19th, 1°.

Plants injured, 1880-81—15 (1), 13 (2), 3 (3)—*Cistus ladani-ferus*, 1. *Cotoneaster microphylla*, 2 ; *C. Simonsii*, 2. *Cratægus Pyracantha*, 2. *Eriobotrya japonica*, 1. *Forsythia viridissima*, 2. *Fuchsia Riccartoni*, 2. *Jasminum nudiflorum*, 3. *Lonicera fragrantissima*, 1. *Osmanthus ilicifolius*, 1. *Picea Nordmanniana*, 2. *Rhododendron ponticum*, 2. *Roses*, H. P.'s, 1 ; stands. on briar, 1. *Wistaria sinensis*, 2.

2. YORK, Whitwell Hall.—E. V. Harcourt, Esq.

Gen. Char. of Soil—Chiefly clay, with some sand over oolite.

Alt. and Exposure—About 280 ft. ; sheltered on all sides.

Rainfall, 1880—[York, dist., 12 ms., S. ; alt., 53 ft. ; 30·93 ins., on 179 days].

Date of Onset and Duration of Frost—Dec. 25th to Feb. 2nd.

Min. Temps. and Dates—Oct. 3rd, 27° ; 4th, 26° ; 20th, 18° ; Nov. 2nd, 18° ; 21st, 16° ; 23rd, 17° ; Jan. 14th, 9° ; 16th and 21st, 6° ; 15th, 1° ; April 4th, 19° ; 23rd, 26°.

Plants injured, 1880-81—2 (1), 3 (2), 4 (3)—*Cedrus Deodara*, 3. *Cotoneaster frigida*, 1. *Garrya elliptica*, 3. *Ivy*, 3. *Jasminum nudiflorum*, 3. *Laurel*, common, 2 ; Do. Portugal, 1. *Roses*, stands., 2 ; *Tea*, 2.

DIVISION X.—N. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881,
FROM CUMBERLAND, DURHAM, NORTHUMBERLAND AND
WESTMORELAND.

CUMBERLAND. *Rainfall* [small along coast], 4·37 ins. less than of 1879; 10·45 ins. below av. of 16 yrs. (Braystones). Do. probably the lowest on record (St. Bees). Do. 7·5 ins. below av.; Oct., 6° colder than av. of 19 yrs. (Cockermouth). Min. rainfall, Braystones, alt., 36 ft.; ht., 3 ft. 8 ins.; 27·21 ins.: max., Styhead Tarn, alt., 1472 ft.; 118·4 ins. *Min. temps.*, Jan. 16th, 1881,—Castletown, alt., 100 ft.; -9°: and Carlisle, alt., 114 ft.; -10°·5: Alston, Jan. 17th, -9°: Jan. 16th,—Scaleby, alt., 111 ft.; -7°: Kirk Linton, alt., 20 ft.; -6°: Silloth, alt., 29 ft.; 0°: Stapleton, alt., 400 ft.; 2°: Cockermouth, alt., 144 ft.; 4°·4: and Seathwaite, alt., 389 ft.; 6°·9.

Plants injured, 1880-81—69 (1), 87 (2), 65 (3), total at 7 places.

DURHAM. *Rainfall*, 2 ins. below av. of 20 yrs. in first 5 months (Seaham, Sunderland). Excessive in last 4 months (Durham). Min. rainfall, Sunderland, alt., 120 ft.; ht., 6 ins., 25·71 ins.: max., Wolsingham, 464 ft.; ht., 1 ft.; 40·77 ins., on 180 days. *Min. temps.*, Jan., 1881. Raby Castle, Jan. 26th, -8°: Crawcrook, Jan. 26th, 0°: Durham, alt., 340 ft.; Jan. 17th, 0°·2: Whitburn, alt., 110 ft.; Jan. 26th, 5°.

Plants injured, 1880-81—13 (1), 27 (2), 12 (3), total at 2 places.

NORTHUMBERLAND. Spring, dry; sum. and aut., wet (Bingfield Ho.). *Min. rainfall*, North Shields, alt., 65 ft.; ht., 2 ft. 8 ins.; 25·34 ins., on 187 days: max., Cheviot, alt., 1692 ft.; ht., 4 ft.; 45·75 ins. *Min. temps.*, Morpeth, alt., 35 ft.; Jan. 13th, -13°; 14th, -11° (at alt., 135 ft.; Jan. 13th, 4°; Jan. 14th, 6°): Haydon Br., alt., 291 ft.; Jan. 21st, -6°: Haltwhistle, alt., 167 ft.; Jan. 25th, -1°: Alnwick Cas., alt., 214 ft.; Jan. 17th, -2°: N. Shields., alt., 98 ft.; Jan. 27th, 6°: Corbridge, alt., 275 ft.; Jan. 17th, 26th, 3°: Bywell, alt., 87 ft.; Jan. 17th, 7°.

Plants injured, 1880-81—57 (1), 92 (2), 74 (3), total at 2 places.

WESTMORELAND. *Rainfall*, bel. av. for 3rd yr.; 5 ins. below av. (Kendal). Min. rainfall, Brougham Hall, alt., 470 ft.; ht., 5 ft.

5 ins. ; 31·61 ins., on 163 days : max., Patterdale (Greenside Mine), alt., 1000 ft. ; ht., 1 ft. 6 ins. ; 83·56 ins. ; Jan. 1881, very dry with 3 wks. severe frost ; ice, 1 ft. thick ; temp. in shade, below 32° on 22 days (Elterwater). *Min. temps.*, Kendal, alt., 500 ft. ; Jan. 25th, 2° : Belfield, Jan. 16th, 5°.

Plants injured, 1880-81 — 16 (1), 19 (2), 7 (3), total at 2 places.

REPORTS.

1. CUMBERLAND—CARLISLE, Castletown.—Mr. A. Smith. [See p. 105.]

Rainfall, 1880—25·90 ins.

Date of Onset and Duration of Frost—Jan. 12th to 31st, on six nights, temp. at or below 0°.

Min. Temps. and Dates—Jan. 14th, 0° ; 15th, -1° ; 16th, -9° ; 21st, 2° ; 22nd, -1° ; 24th, -1° ; 26th, -2°.

Plants injured, 1880-81—11 (1), 13 (2), 22 (3)—*Araucaria imbricata*, 2. *Aucuba japonica*, 1 ; *Do. varieg.*, 1. *Buddleia globosa*, 1. *Cedrus Atlantica*, 3 ; *C. Deodara*, 3. *Celery*, well covered, 3. *Deutzia scabra*, 3. *Eucalyptus globulus*, well covered, 1. *Euonymus japonicus*, well covered, 3. *Fuchsia Riccartoni*, 2. *Jasminum nudiflorum*, 3. *Kalmia latifolia*, 3. *Lettuce*, hardy green, 3. *Lilac*, 3. *Medlar*, 3. *Onions*, winter, 2. *Paulownia imperialis*, 1. *Quince*, 3. *Roses*, dwfs., H. P.'s, stands. and Teas, all more or less kd. to grd., but are shooting again, 2. *Sequoia gigantea*, 3. *Skimmia japonica*, in a cool frame, 3. *Strawberries*, 3. *Tritoma uvaria*, well covered, 3. *Wallflowers*, new golden stood best, 3. *Weigela*, 3.

Observations—Of the last three winters that of 1880-81 was the most severe. Many plants which withstood the two former have this yr. been kd. Apples and Pears, of which only very hardy sorts are grown, are looking promising. Peaches on S. wall have set well. They have had no protection, except Royal George, Lord Admirable, and Noblesse. Plums on a W. wall have very little blossom. Onions, Peas, Spinach and all other vegetables exposed to the weather were nearly all kd. ; what were left are only growing slowly (May 10th, 1881).

2. CARLISLE, Rose Castle.—Mr. S. Foster. [See p. 106.]

Rainfall, 1880—29·33 ins.

Date of Onset and Duration of Frost—Oct. 22nd, 12°·7; continued to April 4th.

Min. Temp. and Date—Jan. 16th, -10°·5.

Plants injured, 1880-81—13 (1), 18 (2), 8 (3)—*Araucaria imbricata*, 1. Broccoli, Snow's winter white, Carter's summer and early spring, all, 1. *Cedrus Atlantica*, 2; *C. Deodara*, 2. *Cryptomeria japonica*, 3. *Cupressus borealis*, 3; *C. sempervirens*, 3. *Echeveria metallica*, 2. *Gladiolus*, 2. Laurel, common, var. round-leaved, 2; Do. Portugal, 1. *Magnolia grandiflora*, Exm. var., 2. *Penstemons*, 1. *Rhododendrons*, 2. Roses, dwfs., 2; stands., 1; &c., 1. Strawberries, 2. Wallflowers, 1. *Wistaria sinensis*, 2.

3. CARLISLE, Scaleby Hall.—R. A. Allison, Esq. [See p. 107.]

Rainfall, 1880—29·27 ins. Mean of 10 yrs., 31·49 ins.

Date of Onset and Duration of Frost—Dec. 14th to 31st; min. temps. from 31°·8 to 19°·2; 3 nights only above 32°; Jan. 7th to 27th.

Min. Temps. and Dates—Jan. 14th, 2°; 15th, 0°; 16th, -7°; 17th, 3°; 22nd, 6°·5; 24th, 6°·8.

Plants injured, 1880-81—4 (1), 4 (2), 4 (3)—*Araucaria imbricata*, survived 1860-61, 1. *Aucuba japonica* varieg., 1. *Cedrus Deodara*, 3; *C. Libani*, 3. Holly varieg., 3. Ivy, 1. Laurels, all, 1. *Rhododendrons*, some, 3. *Sequoia gigantea*, 2.

Plants uninjured—*Abies Douglasii*, *Azalea indica*, *Biota orientalis*, *Cupressus borealis*, *C. Lawsoniana*, Holly, *Picea Nordmanniana*, *Pinus Laricio*, *Pyrus japonica*, *Rhododendrons*, including hybs., Yew, do. fastigiate.

Observations—Nothing suffered so much as Portugal Laurels, which are completely kd., but were never touched before.

4. LONGTOWN, Kirklington Hall.—Mr. J. Barry. [See p. 107.]

Rainfall, 1880—[Scaleby, dist., 3 ms.; alt., 112 ft.; 29·27 ins., on 183 days].

Min. Temps. and Dates—[Jan. 14th to 16th ?], -5°, -5°·5, -6°.

Plants injured, 1880-81—6 (1), 13 (2), 7 (3)—*Abies Morinda*, 3. *Araucaria imbricata*, 2. *Aucuba japonica*, 2; Do. varieg., 2. Broccoli, Veitch's, Osborne's, Snow's, &c., all, 1. *Cedrus Atlantica*, 2; *C. Deodara*, 2. *Cephalotaxus Fortunei*, 1. *Cotoneaster Simon-sii*, 3. Fig, 2. *Fuchsia gracilis*, 3. Holly varieg., 2. *Picea lasio-*

carpa, 2; P. Lowiana, 2; P. Pindrow, 2. Quercus Ilex, 3. Roses, H. P.'s and Teas, nearly all, 1; more hardy sorts, 2. Sequoia gigantea, 3.

5. PENRITH.—Mr. J. Curwen. [See p. 107.]

Rainfall, 1880—[Alt., 575 ft.; 30·07 ins., on 153 days].

Min. Temp. and Date—[Jan 16th ?], -5°.

Plants injured, 1880-81—Artichoke, globe, all, 1. Borecole, all, 1. Broccoli, all Knight's protecting and Cattell's eclipse, 1. Brussels sprouts, all, 1. Celery, 200 plants, 1. Lettuce, all of "all the year round," 1.

Observations—Shrubs, we have very few shrubs, and none were lost by frost.

6. RAVEN-GLASS, Gosforth.—Miss Senhouse. [See p. 108.]

Rainfall, 1880—[Raven-glass, alt., 80 ft.; 34·83 ins. on 116 days].

Date of Onset and Duration of Frost—Hard frosts on Oct. 20th, 21st, and Nov. 1st. Severe weather from Jan. 6th to 27th. Snow on Jan. 11th, 12th, and heavily on 16th, with severe fall and great cold on 18th.

Min. Temps. and Dates—[Jan. 16th ?], 9° [Cockermouth, dist., 16 ms., N.; alt., 144 ft.; Jan. 16th, 4°·4]. Wherever the snow rested, vegetation has been most luxuriant.

Plants injured, 1880-81—5 (1), 6 (2), 6 (3)—Aucuba jap. varieg., 3. Cytisus carolina, 3. Desfontainea spinosa, 3. Eucalyptus globulus, 1 (G).^{*} Halesia tetraptera, 1 ? . Quercus Suber (but in full leaf, June 21st), 2. Rhododendrons, on low grd. only, 3. Wallflowers (excepting Kandahar seedlings), 2.

Plants uninjured—All plants which survived the winter of 1879-80 have done well, except Myrtles and Berberis Darwinii, both, 2. Abies Morinda, Azalea amæna (G), A. indica (G), Broccoli, Brussels sprouts, Chimonanthus fragrans, Clematis Jackmanni, C. montana, Cotoneaster microphylla, C. Simonsii, Cratægus Pyracantha, Dentzia scabra, Echeveria metallica, Fuchsia gracilis, F. Riccartoni, Hydrangea Horstensia, Holly, round-leaved and varieg., Siberian Lilac, Lonicera japonica, Narcissus, Paulownia imperialis (at Ponsonby Hall), Piptanthus nepalensis, Pyrus jap., Retinosporas, Rhododendrons have flowered plentifully in Gosforth. Ribes sanguinea, Roses, H.P.'s, e.g. John Hopper, Duke of Edinburgh, Tea, e.g. Gloire de Dijon,

* Plants with (G) grow in Gosforth, within one mile distant.

Wallflowers (Kandahar seedlings only), *Wistaria sinensis* (G), *Yucca aloifolia* (G).

7. RAVEN-GLASS, Santon.—Mr. J. Gaitskell. [See p. 108.]

Rainfall, 1880—Raven-glass, dist., 3 ms.; 34·83 ins.

Date of Onset and Duration of Frost—Oct. 20th, 22°; 21st, 21°; Nov. 1st to 4th, 8th, 10th; 14th to 23rd; Dec. 17th to 20th, 19°; Jan. 1881, 6th to 27th.

Min. Temps. and Dates—Jan. 16th, 5°; 26th, 4°·5.

Plants injured, 1880-81—29 (1), 33 (2), 23 (3)—*Abies Mo-rinda*, 3. Almonds, 2. Apricots, small trees, 1. *Araucaria imbricata*, 12 ft., 1; larger trees, 3; small trees, all more or less injured. *Arbutus Andrachne*, 2; *A. Unedo*, large trees at 120 ft., 1; at 150 ft., 2; at 500 ft., 3, at 500 ft. very little injured. *Arundo Donax*, 1. *Aucuba jap. varieg.*, 3. *Ceanothus americanus*, 1; *C. azureus*, 1; *C. dentatus*, 1; *C. grandiflorus*, 1. *Cercis siliquastrum*, 2. *Chimonanthus fragrans*, 2. *Cistus ladaniferus*, 2. *Cryptomeria elegans* and *C. jap.*, exposed to winds, 2. *Cunninghamia lanceolata*, 2. *Cupressus macrocarpa*, small plants, 1 or 2; larger, 3. *Desfontainea spinosa*, small one, 1; one plant, 3 by 3 ft., lost leaves, but breaking at tips; one twice as large, at 500 ft., very little if at all injured, 3. *Escallonia Ingrami*, 2; *E. macrantha*, 2; *E. montevidensis*, 1; *E. rubra*, 2. *Euonymus radicans*, 2. *Eurybia ilicifolia*, 1. *Fabiana imbricata*, 3. *Fuchsia coccinia*, 3; *F. gracilis*, 2; *F. Riccartoni*, 2. *Griselinia littoralis*, 1. *Hibiscus syriacus*, 3. Hyacinths, 3. *Hydrangea arborescens*, 2; *H. Hortensia*, 1. *Jasminum officinale*, 3. *Juglans regia*, a tree 10 or 12 years old, cracked to 10 or 12 ft. up the bole; (smaller trees uninjured). Laurel, common, 1, 2; round-leaved, 3; *L. Colchica*, 3; *L. Portugal*, 1, 2. Nectarines, small, 2. *Paulownia imperialis*, 1. Peaches, on wall, 2. *Picea lasiocarpa*, by wind, 3; *P. Pindrow* or *Webbiana*, at 120 ft., cannot make a leader in consequence of spring frosts; at 500 ft. it grows freely. *Pinus insignis*, small, 1. *Quercus glabra*, 3. *Raphiolepis ovata*, 1. *Rhododendron arboreum*, hybs., much cut, 2; others, 3. *Ribes speciosa*, 2. Roses, at 500 ft. blooming almost as well as usual, H.P.'s on Manetti, 2; stands., 2. *Sequoia sempervirens*, 3. *Spartium junceum*, 3. *Yucca filamentosa*, 3; *Y. gloriosa*, 3.

1. DURHAM — RYTON, Crawcrook. — Mr. W. Charlton. [See p. 110.]

Rainfall, 1880 — [Newcastle, dist., 7 ms., E.; alt., 105 ft.; 27·39 ins.].

Date of Onset and Duration of Frost—Oct. 19th, 26°; followed by occasional frosts; severe frost from Jan. 9th to 12th, 28°; 14th, 15th, 20°; 17th, 8°.

Min. Temp. and Date—Jan. 26th, 0°.

Plants injured, 1880-81—9 (1), 13 (2), 0 (3)—*Arbutus Andrachne*, 1. *Aucuba jap. varieg.*, 2. *Cotoneaster Simonsii*, 2. *Cryptomeria elegans*, 2. *Daphne Mezereum*, 2. *Deutzia scabra*, 2. *Euonymus europæus*, 1; *E. radicans*, 2. Pears, 2. *Picea Nordmanniana*, 2. Roses, H. P.'s, 2. *Weigela rosea*, 2. *Yucca aloifolia*, 1.

2. SUNDERLAND, Whitburn Hall.—Mr. J. Dobson. [See p. 111.]

Rainfall, 1880—[Sunderland, mean of 4 obs.; alt., 120 to 132 ft.; 27·79 ins.].

Min. Temp. and Date—Jan. 26th, 5°. Therm. in recess in a N. wall.

Plants injured, 1880-81—4 (1), 14 (2), 12 (3)—Broccoli (excepting Carter's champion, and a late local var. only saved), 1. *Cotoneaster microphylla*, 1. *Cratægus Pyracantha*, 2. Furze, 2. Holly, 2; *Do. varieg.*, 2. Ivy, 2. Laurels, all, 2. *Quercus Ilex*, 2. Roses, dwfs., 3; H.P.'s, 3. Strawberries, 3.

Observations—The winter of 1880-81 has proved most disastrous to the few evergreens, *e.g.* Laurels, Bay and common, that thrive on this exposed coast. They were much enfeebled by the two previous winters, and are mostly cut down to the snow line. Fruit trees have suffered much less than in 1878-9, doubtless owing to the better summer of 1880, which brought the wood to a better state of maturity. Vegetables have also suffered less, no doubt, in consequence of the long protection of snow.

1. NORTHUMBERLAND—ALNWICK, The Castle.—Mr. A. Ingram. [See p. 112.]

Rainfall, 1880—30·51 ins.

Date of Onset and Duration of Frost—Nov. 20th, more or less till middle of April, 1881.

Min. Temp. and Date—Jan. 17th, -2°.

Plants injured 1880-81 — 14 (1), 12 (2), 20 (3)—*Berberidopsis corallina*, 1. *Buddleia globosa*, 1. *Ceanothus azureus*, 1; *C. grandiflorus*, 1. *Cedrus Atlantica*, 3; *C. Deodara*, 3. *Cotoneaster micro-*

phylla, 3; *C. Simonsii*, 3. *Cratægus Pyracantha*, 2. *Cryptomeria elegans*, 3; *C. japonica*, 3. *Desfontainea spinosa*, 1. Holly, many, 1, 2; *Do. varieg.*, many, 1, 2. Ivy varieg., 3. *Ligustrum lucidum*, 3. *Liquidambar styraciflua*, 1. *Lonicera japonica*, 2. *Picea lasiocarpa*, 2; *P. Nordmanniana*, 3. *Quercus Ilex*, 2. *Rhododendron ponticum*, 1; *hybs.*, 3. Roses, stands., 2. Yew, 3; *Do. fastigiata*, 3. *Yucca aloifolia*, 3.

2. MORPETH, Bothalhaugh—W. C. Ellis, Esq.

Gen. Char. of Soil—A deep sandy loam.

Alt. and Exposure—35? ft.; in a close valley by a river with steep banks.

Rainfall, 1880-81—27·98 ins.

Min. Temps. and Dates—Jan. 13th, -13° ; 14th, -11° : at 100 ft.; Jan. 13th, 4° ; 14th, 6° .

Plants injured, 1880-81—43 (1), 80 (2), 54 (3)—Almond, 3. *Acer polymorphum*, some, 3. *Ampelopsis Veitchii*, 3. Apricots, Siberian, 3; *Do. vulgaris*, maculata, 2. *Aralia Sieboldii*, 3; *A. japonica*, 2. *Arbutus Andrachne*, 2. *Ardisia jap.*, 2. *Azara crassifolia*, 2; *A. dentata*, 2; *A. Gillesii*; *A. microphylla*, 2. *Bambusa Fortunei*, 2. *Benthamia fragifera*, 1. *Berberidopsis corallina*, 1. *Biota sempaurescens*, 2. *Broussonetia papyrifera*, 1. *Bupleurum fruticosum*, 2. *Castanea vesca*, 3; *Do. varieg.*, 2. *Catalpa syringæfolia*, 2; *Do. aurea*, 1, 2; *Do. Kœmpferi*, 2. *Ceanothus azureus*, 3. *Cedrus Atlantica*, 2; *C. Deodara*, 1, 2; *C. Libani*, 2. *Cephalanthus orientalis*, 2. *Cephalotaxus Fortunei*, 2. *Cercis siliquastrum*, 2. *Chimonanthus fragrans*, 2. *Choisya ternata*, 1, 2. *Clematis Jackmanni*, 3. *Clanthus puniceus*, 1. *Colletia ferox*, 1. *Colutea arborescens*, 3. *Cratægus Pyracantha*, 3. *Cryptomeria elegans*, 2; *C. japonica*, 1, 2. *Cupressus Lawsoniana*, 3; *C. macrocarpa*, 1; *C. sempervirens*, 1; *C. torulosa*, 1. *Cydonia*, several sorts, 3. *Dacrydium cupressinum*, 2. *Daphne indica*, 3. *Diospyros Lotus*, 3. *D. Mazelli*, 3; *D. virginicus*, 3. *Elæagnus reflexa*, 3. *Erica*, many kinds, 1, 2. *Eriobotrya japonica*, 1. *Escallonia Ingrami*, 2; *E. macrantha*, 2; *E. montevidensis*, 2; *E. rubra*, 3. *Eugenia apiculata*, 2. *Eurybia tomentosa*, 3. *Fabiana imbricata*, 1. *Fitzroya patagonica*, 2. *Forsythia elegans*, 3; *F. viridissima*, 2; *F. suspensa*, 3. *Fremontia californica*, 1. *Griselinia littoralis*, 2. *Halesia diptera*, 3; *H. tetraptera*, 3. *Hibiscus syriacus*, 1. Holly, 3; *Do. varieg.*, 3. *Hydrangea arborescens*, 2; *H. Hortensia*, 2; *H. japonica*, 2; *H. Otaksa*, 2.

Ivy, 3; *Do. varieg.*, 3. *Juniperus chinensis glauca*, 3; *J. excelsa stricta*, 2; *J. Henryi*, 1; *J. japonica*, 1; *J. oblonga pendula*, 2; *J. phœnicia*, 3; *J. rigida*, 2. *Kalmia latifolia*, 2. *Kœlreuteria paniculata*, 2. *Larix Kämpferi*, 3. *Lepedeyia bicolor*, 3. *Libocedrus chilensis*, 1; *L. viridis*, 1; *L. decurrens*, 3. *Liquidambar styraciflua*, 1. *Lonicera fragrantissima*, 3; *L. flexuosa*, 2; *L. grata*, 2; *L. japonica*, 2; *L. Periclymenum*, 2. *Maclura aurantiaca*, 2. *Magnolia gran.*, Exm. var., 1. *Menziesia polifolia*, 1, 2. *Morus hispanica*, 2; *M. cosmopolitana*, 2. *Negundo fraxinifolia*, 2. *Oreodaphne*, 2. *Osmanthus aquifolius*, 1, 2; *O. ilicifolius*, 1, 2. *Paliurus aculeatus*, 3. *Pernettya mucronata*, 3. *Phillyrea angustifolia*, 2; *P. oleifolia*, 3. *Photinia glabra*, 2; *P. serrulata*, 2. *Picea bracteata*, 3; *P. Pindrow*, 2; *P. Pinsapo*, 3; *P. Veitchii*, 3. *Pinus excelsa*, 1, 2; *P. insignis*, 1; *P. Laricio*, 3; *P. pinea*, 1. *Piptanthus nepalensis*, 1, 2. *Pittosporum Tobira*, 3. *Podocarpus Andina*, 3. *Pyrus floribunda*, 3; *P. japonica*, 3. *Retinospora*, 3. *Rhododendrons*, 3. *Rhus glabra laciniata*, 1, 2. *Ribes pendulum*, 3; *R. speciosum*, 2. *Rubus australis*, 2. *Salisburia*, 3; *Do. varieg.*, 3. *Spartium junceum*, 1. *Spiræa*, sorts, 3. *Taxodium distichum*, 2. *Walnuts*, 2. *Weigela*, sorts, 3. *Yew*, 2, 3; *Do. fastigiata*, 2, 3.

Plants uninjured—*Abies Douglasii*, *A. glauca*, *A. Morinda*, *Almond*, *Ampelopsis hederacea*, *Aristolochia Sipho*, *Arthrotaxus imbricata*, *Azalea amœna*, *Buxus japonica*, *Castanea chrysophylla*, *Chamæcyparis sphæroidea*, *Clematis montana*, *Colutea arborescens*, *Cupressus borealis*, *C. Lawsoniana*, *Daphne collina*, *Elæagnus longipes*, *Euonymus radicans*, *Larix japonica*, *Nuttallia cerasiformis*, *Olearia Haastii*, *Paulownia imp.*, *Pernettya angustifolia*, *P. floribunda*, *Picea amabilis*, *P. cephalonica*, *P. grandis*, *P. lasiocarpa*, *P. Nordmanniana*, *P. magnifica*, *P. concolor violacea*, *P. bifida*, *P. pectinata*, *Pyrus japonica*, *Rhus Typhina*, *Ribes alpinum fol. aur.*, *R. aureum*, *præcox*, *Do. serotinum*, *Do. missouriense*, *R. nigrum*, *varieg.*, *Do. fol. aur.*, *R. sanguineum*, fl. pl., *Skimmia japonica*, *Weigela rosea*, *Wistaria sinensis*.

1. WESTMORELAND — BELFIELD, by lake Windermere. — Mr. J. Nicol. [See p. 114.]

Rainfall, 1880—50·56 ins. : max., Nov., 10·28 ins. : min., Aug., 1·36 ins.

Date of Onset and Duration of Frost—About Oct. 15th to Nov. 15th; Jan. 5th to 29th.

Min. Temp. and Date—Jan. 16th, 5°.

Plants injured, 1880-81 — 8 (1), 18 (2), 6 (3)—*Araucaria imbricata*, 3. Artichoke, globe, 1. Asparagus, 2. *Berberis japonica*, 2. Borecole, 2. Broccoli, all sorts, 1. Brussels sprouts, 2. Cabbages, 2. Carnations, 2. Cauliflower, early London, 1. *Cedrus Deodara*, 3. Celery, 1. Endive, 1. *Escallonia macrantha*, 1. Furze, 2. Laurel, Bay, 2. Laurel, common, 3; Do. Portugal, 3. *Laurustinus*, 2. Lavander, 2. Lettuce, 1. Myrtle, 2. Onions, winter, 1. Pampas grass, 1. Parsley, 2. *Quercus Ilex*, 3. Roses, dwfs., 2; H. P.'s, 2; stands., 2; Teas, 2. *Sequoia gigantea*, 2. Wallflowers, 2. *Yucca aloifolia*, 2.

Observations—The winter has been most destructive to all kinds of vegetables. Fruit trees and bush fruit of all kinds are uninjured; Apricots, Nectarines and Peaches being grown within. Shrubs are browned, but not many permanently injured. Roses of all kinds have suffered much, both on briars and Manetti.

2. KENDAL.—C. Wilkinson, Esq. [See p. 113.]

Rainfall, 1880—[Kent Ter., 146 ft.; 45·06 ins.]

Plants injured, 1880-81—8 (1), 1 (2), 1 (3)—*Biota orientalis*, 1. Cabbages, 1. Carnations, some, 1. *Euonymus europæus*, 2, 3. Laurel, Bay, 1. Parsley, 1. Rosemary, 1. Strawberries, some, *e.g.* Keen's seedling, 1. Wallflowers, 1. *Yucca aloifolia*, 1.

Plants uninjured—Apples, Fillbasket and Keswick Codlin, *Araucaria imbricata*, *Clematis montana*, *Cotoneaster microphylla*, *Crataegus Pyracantha*, *Cupressus Lawsoniana*, Hyacinths, *Lilium auratum*, Pears, Bon Chrétien and Marie Louise, *Pyrus japonica*, *Rhodendron vulgare sanguineum*, Roses, dwfs., *Weigela rosea*.

Observations—Notwithstanding the intense frost and cold, as well as snow, and long continuance of the past winter, my garden has not suffered so much as might have been expected; a fact which I attribute to its aspect and elevation.

DIVISION XI.—WALES AND MONMOUTH.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN.
1881, FROM N. AND S. WALES AND MONMOUTH.

N. WALES—DENBIGHSHIRE. *Rainfall* above av. ; early part of year dry (Rosset).

FLINT. *Rainfall*, 9 ins. above av. of 14 yrs. (Mold).

MONTGOMERY. *Rainfall* moderate, with heavy flood in Dec. (Dolenog).

Min. rainfall for N. Wales ; Hawarden (Flint), alt., 270 ft. ; 31·53 ins. : max., Rhiwbryfdir (Mer.), alt., 1100 ft. ; ht., 10 ft. ; 98·29 ins., on 168 days, Jan. 1881. The most severe weather known for 20 yrs. (Carno). *Min. temps.* for N. Wales : Abergele, Jan. 20th, -11° [?] : Corwen, alt., 157 ft. ; Jan. 16th, -8° : Wrexham, alt., 192 ft. ; Jan. 16th, -2°·5 : Carno, alt., 595 ft. ; Jan. 26th, 0° : Powis Castle, alt., 420 ft. ; Jan. 15th, 16th, 3° : Colwyn Bay, alt., 180 ft. ; Jan. 21st and 26th, 14°·2 : Holyhead, alt., 44 ft. ; Jan. 15th, 24°.

Plants injured, 1880-81 — 58 (1), 80 (2), 58 (3), total at 5 places in N. Wales.

S. WALES — CARMARTHENSHIRE. The direst year since 1870 (Carmarthen). Do. since 1873 (Tegfynydd).

PEMBROKESHIRE. The direst of last 7 yrs. (Stackpole Ct.). *Rainfall*, below av. (Narberth). Do. 7·83 ins. below av. of 25 yrs. (Haverfordwest).

Min. rainfall, for S. Wales ; St. Ann's Head (Pemb.), alt., 150 ft. ; ht., 8 ins. ; 32·64 ins., on 189 days : max., Aberdare (Glam), alt., 735 ft. ; ht., 1 ft. ; 84·79 ins., on 188 days. *Min. temps.*, for S. Wales ; Cardigan, alt., 206 ft. ; Jan. 20th, -10° : Malgwyn, alt., 200 ft. ; -2° : Gogerddan, alt., 50 ft. ; Jan. 14th, 0° : Haverfordwest, alt., 94 ft. ; Jan. 20th, 1° : Rhayader, alt., 212 ft. ; Jan. 15th, 17th, 2° : Carmarthen, alt., 188 ft. ; Jan. 15th, 3°·8 : Llandovery, alt., 208 ft. ; Jan. 15th, 4° : S. Fagan's Castle, alt., 100 ft. ; Jan. 22nd, 6°.

Plants injured, 1880-81—97 (1), 156 (2), 97 (3), total at 6 places in S. Wales.

MONMOUTH. *Rainfall*, 43·7 ins.; excepting 4 yrs., below av., since 1865. Jan. 1881, unusually low temp. for a length of time, calm, excepting 18th and 19th, when a cutting N.E. wind blew (Llanfrechfa). *Min. temp.*, alt., 326 ft.; Jan. 15th, 11°.

Plants injured, 1880-81—15 (1), 13 (2), 17 (3), total at 1 place.

REPORTS.

1. N. WALES—CARNARVON, Bangor, Treborth Park.—Mr. J. Fitzpatrick. [See p. 118.]

Rainfall, 1880—[Carnarvon, dist., 9 ms., alt., 120 ft.; 40·26 ins., on 171 days].

Min. Temp. and Date—[Llanduduo, dist., 14 ms., E.; Jan. 26th, 14°·5].

Plants injured, 1880-81—14 (1), 13 (2), 9 (3)—*Biota orientalis*, 3. Broccoli, Adam's early white, Leamington, Dilcock's bride, and Wilcove's late, 1. Brussels sprouts, 2. *Ceanothus azureus*, 2; *C. dentatus*, 2. *Cotoneaster Simonsii*, 3. *Cryptomeria elegans*, 2. *Cupressus Lawsoniana*, 3. *Escallonia montevidensis*, 2. *Fuchsia gracilis*, 1; *F. Riccartoni*, 1. *Hydrangea Hortensia*, 1; *H. japonica*, 1. *Ligustrum lucidum*, 3. Roses, dwfs. on Manetti, 1, 2; stands on briars, 1, 2. *Sequoia gigantea*, 3.

1. DENBIGH—ABERGELE, Hafodunos.—Mr. J. McNair. [See p. 119.]

Rainfall, 1880—[Garthewin, alt., 363 ft.; 47·5 ins.].

Date of Onset and Duration of Frost—Jan. 2nd to 30th.

Min. Temps. and Dates—Jan. 20th, -11° [too low ? Colwyn Bay, Jan. 21st and Nant-y-glyn, alt., 180 ft.; Jan. 26th, 14°·2].

Plants injured, 1880-81—14 (1), 23 (2), 14 (3)—*Abies Morinda*, 3. *Araucaria imbricata*, 1, 2, 3. Artichoke, globe, 3. *Aucuba japonica*, 2; *Do. variegata*, 2. Broccoli (see below), 1. Cauliflower (see below), 1. *Ceanothus azureus*, 1. *Cedrus Deodara*, 2. *Cryptomeria elegans*, 3. *Desfontainea spinosa*, 1. *Eurybia argophylla*, 3. *Fitzroya patagonica*, 3. *Gunnera scabra*, 3. *Hydrangea Hortensia*, 2. *Kalmia latifolia*, 3. *Menziesia polifolia*, 3. *Piptanthus nepalensis*, 2. *Quercus glabra*, 1. Roses, dwfs. on Manetti, 2;

stands. on briars, 1. Salisburia, 3. Strawberries, Sir Harry, British Queen, and Frogmore late Pine, all, 2. Veronica Traversi, 2.

Observations—Broccolis, killed, Granger's autumn white, Veitch's self-protecting autumn, Dickson's superb spring white, Osborne's winter white, Knight's self-protecting, Dickson's late winter; of Cattell's eclipse, a few escaped. Cauliflowers, killed, Veitch's autumn giant, Walcheren and early London.

2. COLWYN, Nant-y-Glyn.—Mr. A. O. Walker. [See p. 119.]

Rainfall, 1880—38·98 ins.

Date of Onset and Duration of Frost—Jan. 7th to 27th.

Min. Temp. and Date—Jan. 26th, 14°·2.

Plants injured, 1880-81—6 (1), 9 (2), 17 (3)—*Arbutus Unedo*, 3. *Benthamia fragifera*, 1. *Berberis Darwinii*, 3; *B. nepalensis*, 3. *Clianthus puniceus*, 2. *Cupressus funebris*, 3. *Dahlia variabilis*, single, 1. *Dracæna australis*, 2. *Eriobotrya japonica*, 2. *Eryngium pandanifolium*, 2. *Escallonia macrantha*, 3; *E. montevidensis*, 3; *E. rubra*, 3. *Eucalyptus coccifera* (?), 1. *Eugenia apiculata*, 2; *E. Ugni*, 1. *Fabiana imbricata*, 3. *Fremontia californica*, 3. *Fuchsia discolor*, 3; *F. exorticata*, 3; *F. Madame Cornelesson*, 3; *F. radicans*, 3. *Illicium religiosum*, 3. *Laurustinus*, 3. *Leptospermum scoparium*, 3. *Myrtle*, 2. *Pittosporum tenuifolium*, 2. *Quercus austriaca*, 3. *Roses*, dwfs. and H.P.'s, a few, 1; many, 2 or 3; stands., many, on briar, 1.

Plants uninjured—*Azalea amæna*, *Azara Gillesii* (small), *Bambusa Fortunei*, *Berberis japonica*, *B. Wallichii*, *Biota orientalis*, *Boussingaultia*, *Brugmansia sanguinea*, *Buddleia globosa*, *Bupleurum fruticosum*, *Catalpa syringæfolia*, *Cedrus Atlantica*, *C. Deodara*, *C. Libani*, *Cephalotaxus Fortunei*, *Cerasus ilicifolius*, *Chamærops excelsa*, *Choisya ternata*, *Cryptomeria elegans*, *Cunninghamia sinensis*, *Cupressus borealis*, *C. Lambertiana*, *C. Lawsoniana*, *C. macrocarpa*, *C. sempervirens*, *C. torulosa*, *Daphne Fioniana*, *Desfontainea spinosa*, *Deutzia scabra*, *Elæagnus argentea*, *E. pungens*, *Erica carnea*, *Escallonia Ingrami*, *Ferns* (see *Gard. Chron.*, 1881, vol. xvi., p. 118), *E. radicans*, *Fuchsia gracilis*, *F. Riccartoni*, *Gladiolus tristis* and others, *Griselinia littoralis*, *Gunnera scabra*, *Hibiscus syriacus*, *Hyacinths*, *Hydrangea Hortensia*, *H. japonica*, *Hypericum Calycinum*, *Iris chamæiris*, *I. germanica*, *I. Guldenstœdtii*, *I. Histrio*, *I. persica* and *I. tuberosa* under S.W. wall, *I. Kämpferi*, *I. punica* vars., *Jasminum fruticosum*, *Laurel*, common, round-leaved, *Colchica*, *Cau-*

casica and Portugal, *Libocedrus chilensis*, *L. decurrens*, *Ligustrum lucidum*, *Lonicera fragrantissima* on S.E. wall, *L. japonica* on do., *Mespilus canadensis*, *Narcissus bulbocodium*, *N. citrina*, *juncifolium*, *Graelsii* and *pallidulus* by S.W. wall, *Olearia Haastii*, *Paulownia imperialis*, *Penstemon digitalis*, *P. hybrids*, *P. pubescens*, *P. Palmeri* and *P. speciosus* under S.W. wall.

1. MERIONETH—CORWEN, Rüg.—Mr. J. Bennett. [See p. 120.]

Rainfall, 1880—alt., 157 ft.; 44·13 ins.

Date of Onset and Duration of Frost—Oct., and continued with great severity to the end of March, with occasional slight frosts in April.

Min. Temp. and Date—Jan. 16th, -8°.

Plants injured, 1880-81—13 (1), 15 (2), 3 (3)—*Araucaria imbricata*, 1. Brussels sprouts, 1. *Cedrus Atlantica*, 2; *C. Deodara*, 2. *Clematis Jackmanni*, 2; *C. montana*, 2. *Cotoneaster*, 2. *Escallonia rubra*, 1. Hollies, 2; *Do. varieg.*, 2. *Kalmia latifolia*, 3. *Picea Pinsapo*, 3. *Pyrus japonica*, 2. *Rhododendrons*, 2. *Roses*, dwfs., on own roots, kd. to grd., 2; *H. P.'s*, 2; stands. on briars, 1. *Sequoia gigantea*, 2. *Strawberries*, 2. *Wistaria sinensis*, 2. *Yew*, *fastigiata*, 2.

Observations—Hollies are leafless, the branches being kd. back to the main stem.

1. MONTGOMERY—WELSHPOOL, Powis Castle.—Mr. W. Lee. [See p. 120.]

Rainfall, 1880—38·3 ins.

Date of Onset and Duration of Frost—Oct. 3rd, 29°, continued more or less till May 11th; 90 frosty nights. The E. wind and storm on Jan. 18th appear to have done more damage than the frost.

Min. Temps. and Dates—Jan. 14th, 8°; 15th and 16th, 3°.

Plants injured, 1880-81—11 (1), 20 (2), 15 (3)—Apples, early, 3. *Arbutus Andrachne*, 1. *Biota orientalis*, 3. *Borecole*, 1. *Broccoli*, all, 1. *Cabbages*, 2. *Carnations*, 1. *Cryptomeria japonica*, 3. *Cupressus sempervirens*, 2. *Hydrangea Hortensia*, 3. *Lettuce*, 3. *Parsley*, 3. *Phillyrea angustifolia*, 2. *Phormium tenax*, 1. *Picea amabilis*, 3. *Pinus insignis*, 3. *Quercus glabra*, 3. *Rhododendrons*, hybs. and *ponticum*, 2. *Roses*, stands., 3; *Tea*, 1.

1. S. WALES—CAERMARTHEN, Whitland, Maesgwynne.—Mr. T. Higgins. [See p. 121.]

Rainfall, 1880—[Caermarthen, dist., 13 ms., E.; alt., 92 ft.; 48·28 ins., on 215 days].

Min. Temps. and Dates—[Jan. 15th ?] -2°: [Caermarthen, alt., 188 ft.; Jan. 15th, 30·8].

Plants injured, 1880-81—19 (1), 20 (2), 21 (3)—Almond, 3. Aloysia citriodora, 3. Aralia Sieboldii, 1. Arbutus Andrachne, 3. Arundo conspicua, 1, 2; Donax, 1, 2. Azalea amæna, 3. Bambusa Fortunei, 3. Broccoli (see below), 2. Cauliflower (see below), nearly all, 1. Ceanothus americanus, 3. Cunninghamia sinensis, 3. Desfontainea spinosa, 1. Dracæna australis, 2. Euonymus radicans, 2. Forsythia viridissima, 3. Fuchsia Riccartoni, 3. Hibiscus syriacus, 3. Hydrangea arborescens, 1, 2, 3. Kalmia latifolia, 3. Lonicera japonica, 3. Mulberry, 3. Onions, winter, two-thirds, 1. Photinia serrulata, 1. Picea Pinsapo, 3. Pittosporum Tobira, 3. Roses, H.P.'s, two, 1; Teas, seven, 1. Veronica Andersoni, 1; V. salicifolia, 1; V. Traversi, 1. Wallflowers, 1. Yucca gloriosa, 2.

Plants uninjured—Borecole, dwarf and tall, green and curled; Broccoli, 90 p. c. saved, very large in W. border; Brussels sprouts; Cabbages, *viz.*, Cocoanut, Enfield Market, Heartwell, Wheeler's Imperial, planted early in aut. from seed-bed. *Coniferae*, Abies, Picea and Pinus sp. have stood the winter remarkably well; Wellingtonias (Sequoia gigantea) in groups of threes, have those facing N.E. and S.E. greatly damaged; the others, unhurt. *Fruit trees*, Apples, Cherries, Nectarines, Peaches, Pears and Plums on walls, espalliers or pyramids, bloomed better than they have done for years past. *Bush-fruits*, promise well; and Strawberries, will be about 20 days later than last year. Lettuce, Hardy Hammersmith stands all weathers with a slight protection of bracken. Tripoli Onions, taken from seed bed and planted on S. border are doing remarkably well. Roses, dwfs., pegged down and covered with snow, were thus saved.

1. CARDIGAN—ABERYSTWITH, Gogerddan.—Mr. T. Vearly. [See p. 122.]

Rainfall, 1880—[Alt., 80 ft.; 46·21 ins., on 182 days].

Date of Onset and Duration of Frost—Oct. 1880, eleven days of frost; min. temp., 20th, 19°; Nov., eleven days of frost, min. temp.,

21st, 18°; Dec., eleven days of frost, min. temp., 17th, 20°; Jan. 1881, twenty-six days of frost, fourteen days below 20°; seven on or below 19°; 15th and 25th, 1°; min. temp., 14th, 0°; Feb., fifteen days of frost. Min. temp., 24th, 18°. March, ten days of frost, min. temp., 28th, 20°.

Plants injured, 1880-81—3 (1), 44 (2), 26 (3)—*Arbutus Andrachne*, 2. *Azalea indica*, 3. *Berberidopsis corallina*, 3. *Berberis japonica*, 2. *Biota orientalis*, 3. *Brugmansia sanguinea*, 2. *Buxus balearica*, 3. *Ceanothus americanus*, 2; *C. dentatus*, 2. *Cistus ladaniferus*, 3. *Citrus Aurantium*, 3. *Coronilla glauca*, 2. *Cupressus borealis*, 3; *C. sempervirens*, 3. *Daphne collina*, 2; *D. indica*, 2. *Echeveria metallica*, 3. *Escallonia rubra*, 2. *Euonymus radicans*, 2. *Hydrangea Hortensia*, 2. *Kalmia latifolia*, 3. *Laurel*, common and *Colchica*, 2. *Ligustrum lucidum*, 3. *Lonicera fragrantissima*, 1. *Pinus excelsa*, 3. *Roses*, H.P.'s (on Manetti), 2; stands. on briars, 2; *Teas* on Manetti, 2. *Skimmia japonica*, 3. *Veronica Andersoni*, 2. *Wallflowers*, 2. *Yucca aloifolia*, 3.

Observations—Apricots, Pears and Plums will be scarce; Cherries on wall are setting well; so also are Currants and Gooseberries. (May 3rd, 1881.)

1. ABERYSTWITH, Llanilar.—Mr. J. Londale. [See p. 122.]

Rainfall, 1880—[Goginan, alt., 290 ft.; 47·46 ins., on 188 days].

Min. Temps. and Dates—[Gogerddan, alt., 50 ft.; Jan. 14th, 0°; 15th, 1°].

Plants injured, 1880-81—22 (1), 18 (2), 6 (3)—*Broccolis*, Walcheren, Snow's, Adam's Dalmeny, Wilcox's winter Perfection, Champion, all, 1. *Clematis montana*, 2. *Cotoneaster microphylla*, 2. *Cryptomeria elegans*, 1; *C. japonica*, 3. *Cupressus Lambertiana*, 2; *C. Lawsoniana*, 1. *Escallonia rubra*, 1. *Picea cephalonica*, 3. *Rhododendrons*, Waterer's hybs., of every shade from apple-blossom to the darkest crimson; trees, 40 yrs. old, and never injured previously, all more or less damaged, and flower-beds kd., 2. *Roses*, one-half kd., 1. *Veronica Andersoni*, lilac and white, both, 1.

1. GLAMORGAN—CARDIFF, St. Fagan's Castle.—Mr. R. Crossling. [See p. 122.]

Rainfall, 1880—[Cardiff Cem., alt., 95 ft.; 39·50 ins. on 170 days.]

Date of Onset and Duration of Frost—Nov. 17th to 23rd; Dec.

17th to 21st; Jan. 4th to 27th; Feb. 21st to March 3rd.

Min. Temp. and Date—Jan. 22nd, 6° [Cardiff, alt., 43 ft.; Jan. 23rd, 13°·4].

Plants injured, 1880-81—19 (1), 31 (2), 30 (3)—Almond, 3. *Ampelopsis Veitchii*, young, 3. *Arbutus Andrachne*, 1. *A. Unedo*, 2. *Arundo conspicua*, 2. *Benthamia fragifera*, 1. *Berberidopsis corallina*, 1. *Biota occidentalis*, 1, 2, 3. *Camellias*, 2. *Cedrus Atlantica*, 2; *C. Deodara*, 2, 3. *Cratægus Pyracantha*, 3. *Cupressus Lambertiana*, 3; *C. macrocarpa*, 3; *C. sempervirens*, 2. *Deutzia scabra*, 3. *Escallonia rubra*, 2. *Euonymus europæus*, 3; *E. japonicus*, 1; *E. radicans*, 3. *Fuchsia Riccartoni*, 2. *Hibiscus syriacus*, 3. *Hydrangea arborescens*, 1, 2; *H. Hortensia*, 2; *H. japonica*, 2. Lettuce, standard, 3. *Ligustrum lucidum*, 1. *Picea cephalonica*, by April frosts only, 3; *P. lasiocarpa*, 2; *P. Nordmanniana*, 3. *Pinus insignis*, 2, 3; *P. pinea*, 2. *Pyrus japonica*, 3. *Quercus Ilex*, 3; *Q. Suber*, 3. *Raphiolepis ovata*, 3. *Rhus glabra*, *laciniata*, 1. Roses, stands. on briars, 1, 2, 3; Teas on briars, 2, 3. *Ruscus aculeatus*, 3. *Sequoia sempervirens*, 2. *Skimmia japonica*, 3. *Taxodium distichum*, 2. *Veronica Andersoni*, 1; *V. salicifolia*, 1. *Yucca filamentosa*, 3; *Y. gloriosa*, 2.

Plants uninjured — *Acacia nervosa* (?), *Bellium bellidioides*, *Bellis* (*minima* ?) from Corsica, *Desmodium pendulifolium*, *Platycrater arguta*, *Richardia æthiopica* in a brook frozen over for some time, *Selaginella Kroussiana*, *Wistaria sinensis* growing against a warm wall.

Observations—Myrtles reported as much injured are on walls of houses; all others were killed in 1879-80; *Platanus orientalis* (true Plane), noted as slightly injured, is only hurt to the extent of one or two buds at the extremity of each twig on several trees. *P. occidentalis* is uninjured.

1. PEMBROKE—LLECHRYD, Castle Malgwyn.—Mr. J. Howard. [See p. 124.]

Rainfall, 1880—43·97 ins., on 167 days.

Date of Onset and Duration of Frost — Jan. 6th, 11°, to 26th.

Min. Temps. and Dates—Jan. 19th, 10°; 20th, -10°; 21st, -5°.

Plants injured, 1880-81—21 (1), 32 (2)—*Aloysia citriodora*, 1. *Araucaria imbricata*, large cone-bearing tree, 2. *Arbutus Andrachne*, 1. Artichoke, globe, 2. *Arundo conspicua*, 2. Borecole (excepting As-

paragus Kale), 1. Broccoli, 1. Brussels sprouts, 1. Cabbages, 2. Cedrus Atlantica, 1; C. Deodara, 2. Endive, 1. Escallonia macrantha, 1. Forsythia elegans, 1, 2. Furze, 2. Garrya elliptica, 2. Gladiolus, 2. Holly, varieg., 2. Hydrangea arborescens, 2. Jasminum nudiflorum, 2. Juniperus, weeping var., 1, 2. Laurel, Bay, 2. Laurel, common, breaking from roots, 2; Do. Portugal, 1, 2. Laurustinus, 1. Lavander, 2. Lonicera japonica, 2. Myrtle, 1. Pampas grass, 2. Parsley, 2. Picea Pinsapo, 1. Quercus Ilex, 2 or 3 very large trees, 1. Rhododendrons, com. sorts, 1, 2. Roses, on own roots and on Manetti, recovering well, *e.g.*, H. P.'s, 2; stands. on briars, 1, 2; Teas, 2. Rosemary, 2. Taxodium distichum, 2. Thuja, valuable plants, 1. Tritoma uvaria, 1. Wall-flowers, 1, 2. Wistaria sinensis, 2. Yews, Irish, 1. Yucca aloifolia, 1, 2.

Plants uninjured — Lettuce, some hardy Hammersmith and brown Cos; Primula japonica.

Observation—Primula Cortusoides amæna lives, but does not do so well as P. japonica.

2. NARBERTH, Slebech Park.—Mr. G. Griffin. [See p. 124.]

Rainfall, 1880—Very moderate [Haverfordwest, dist., 5 ms., E.; alt., 95 ft.; 40·76 ins., on 166 days].

Date of Onset and Duration of Frost—Oct. 17th, 21°, to March.

Min. Temps. and Dates—Jan. 15th, 4°; 16th, 1°; 22nd, 5°.

Plants injured, 1880-81—13 (1), 21 (2), 14 (3)—Aloysia citrodora, 1. Ampelopsis Veitchii, 3. Aralia Sieboldii, 1. Araucaria, 2. Aucuba japonica, 3. Azara microphylla, 2. Berberis Darwinii, 1; B. japonica, 3. Broccoli, all, 1. Brussels sprouts, 2. Cabbages, 2. Cedrus Atlantica, 3; C. Deodara, 2; C. Libani, 3. Clematis montana, 3. Cratægus Pyracantha, 3. Daphne collina, 3. Deutzia scabra, 3. Escallonia rubra, 1. Euonymus radicans, 3. Figs, 200 yrs. old?, kd. to grd., 2. Furze, 1. Gleditschia horrida, 3. Grisebinia littoralis, 1. Jasminum nudiflorum, 3; J. officinale, 3. Larch, 1, 2. Laurel, Bay, kd. to grd., 2. Laurel, common, 2; Do. Portugal, 3. Laurustinus, fine, large, 50 yrs. old, 1. Lavander, 2. Lonicera fragrantissima, 2. Mulberry, 2. Myrtle, 1. Olearia Haastii, 2. Onions, winter, 3. Pampas grass, 1. Passiflora cœrulea, 1. Parsley, 2. Quercus Ilex, lost leaves, 2. Raphiolepis ovata, 2. Rosemary, 1. Roses, stands., 2; Teas, on briar, 2. Sequoia gigantea, 3. Tritoma uvaria, 1. Wistaria sinensis, stem, 3 ft. in circum., kd. to grd., 2. Yucca filamentosa, 2.

Plants uninjured—*Berberis macrophylla*, *B. stenophylla*, *Camellias*, *Cistus ladaniferus*, *Ligustrum japonicum*. Nearly all the *Coniferae* do well here, and have passed through the late trying seasons unscathed; out of 50 species, only four seem to have suffered any damage worth mentioning. They are *Araucaria imbricata*, *Cedrus Deodara*, Larch and *Sequoia gigantea*.

Observations—The effect of the last winter's frost upon some species was somewhat singular; as some specimens were nearly killed, others of the same species were quite uninjured. We have a large number of *Wellingtonias*, some of them are very much injured, while others are not in the least hurt. This is even the case with trees growing side by side, and with no difference whatever in situation, soil or growth. The same occurred with the *Araucarias*, and also with *Cedrus Deodara*, those which had made the thickest growth having escaped.

1. MONMOUTH, Henare Gardens.—Mr. T. Coomber.

Gen. Char. of Soil—A tenacious loam, resting on marl; where undrained, wet and very cold.

Alt. and Exposure—Situation low, near a stream, surrounded by higher ground and sheltered by wood from E. winds.

Rainfall, 1880—At Rockfield, dist., $1\frac{1}{2}$ ms.; 39·03 ins., on 146 days.

Min. Temp. and Date—[Llanfrechfa, dist., 16 ms., S.W.; alt., 326 ft.; Jan. 15th, 11°].

Plants injured, 1880-81 — 15 (1), 13 (2), 17 (3) — Artichoke, globe, protected with litter, 3. Asparagus, 3. Borecole, 1. Broccoli, Cattell's eclipse, Early purple sprouting, Knight's protecting, Leamington, Snow's winter white, Veitch's spring white, all, 1. Brussels sprouts, the imported and Scrymger's giant, 1. Cabbages, 3. *Ceanothus Veitchianus*, 1. *Cryptomeria elegans*, 3. *Deutzia scabra*, 3. *Euonymus radicans*, 3. Figs, protected with mats, some, 1. Furze, 3; Do. fl. pl., 2. Kale, Asparagus, Cottager's and dwarf curled, 1. *Kalmia latifolia*, 3. Laurel, common, 2; Do. round-leaved, 2; Do. Portugal, several kd. to grd. and half-killed, 2. *Laurustinus*, several kd. to grd. and half-killed, 2. *Ligustrum lucidum*, 1. Roses, many dwfs., 1; H. P.'s, 1; stands. on briar, 1: Teas on Manetti, 1. *Sequoia sempervirens*, 3. Stocks, 1. *Yucca aloifolia*, 3.

DIVISION XII.—(SCOTLAND) S. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881,
FROM DUMFRIES, KIRKCUDBRIGHT AND ROXBURGH.

DUMFRIES. Aug. dry : all crops, exceptionally good (Wanlockhead). *Min. rainfall*, Dumfries, alt., 159 ft. ; ht., 6 ins. ; 27·02 ins., on 158 days : max., Wanlockhead, alt., 1330 ft. ; ht., 5 ins. ; 56·41 ins., on 166 days. Jan. 1881, severe frost from about Jan. 4th to nearly end : mean temp., $26^{\circ}\cdot3$, greatly below av. (Dumfries, Crichton Inst.). *Min. temps.*, Arkleton, alt., 500 ft. ; Jan. 16th, -17° : Lockerbie, alt., 196 ft. ; Jan. 17th, -8° : Drumlanrig, alt., 191 ft. ; Jan. 17th, -2° : Dumfries, alt., 159 ft. ; Jan. 17th, $3^{\circ}\cdot5$.

Plants injured, 1880-81 — 28 (1), 12 (2), 10 (3), total at 2 places.

KIRKCUDBRIGHT. *Rainfall*, 14·69 ins., below av. of 20 yrs. : mean temp., ·7 above av. (Cargen). Jan. 1881, very severe frost, but little snow (Carsphairn). *Min. temps.*, Cargen, alt., 86 ft. ; Jan. 17th, 7° : Auchencairn, alt., 20 ft. ; Jan. 25th, 11° : Cally, alt., 140 ft. ; Jan. 17th, 13° .

Plants injured, 1880-81—6 (1), 1 (2), 4 (3), total at 1 place.

ROXBURGH. Fine sum., and severe frosts from Nov. to Dec. (Teviothd. Manse, Hawick). *Rainfall*, 5·21 ins., below av. : mean temp., $43^{\circ}\cdot8$, about av. (Melrose). Jan. 1881, lowest mean recorded, $21^{\circ}\cdot9$; temp. below 32° on twenty-nine nights ; below 0° on seven nights ; snow on 9 days, 28·5 ins. ; 9·5 ins. fell on 13th. Tweed frozen (Melrose). *Min. temps.*, Kelso, alt., 130 ft. ; Jan. 17th, -16° : Melrose, alt., 280 ft. ; Jan. 17th, -10° : Wolfelee, alt., 601 ft. ; Jan. 17th, -1° .

Plants injured, 1880-81—39 (1), 19 (2), 8 (3), total at 1 place.

REPORTS.

1. DUMFRIES—LANGHOLM, Arkleton.—Mr. J. Dickson. [See p. 127.]

Rainfall, 1880—50·30 ins.

Date of Onset and Duration of Frost—Nov. 2nd to March 27th, with very little mild weather.

Min. Temp. and Date—Jan. 16th, -17° .

Plants injured, 1880-81 — 17 (1), 9 (2), 4 (3) — *Ampelopsis Veitchii*, 3. *Borecole*, 1. *Brussels sprouts*, 1. *Cabbages*, 3. *Cedrus Libani*, 1. *Celery*, 1. *Cotoneaster microphylla*, 2; *C. Simonsii*, 2. *Crataegus Pyracantha*, 1. *Escallonia macrantha*, 1. *Eucalyptus globulus*, 1. *Garrya elliptica*, 1. *Holly*, 2; *Do. variegated*, 1. *Ivy*, 2. *Jasminum nudiflorum*, 3; *J. officinale*, 1. *Juniperus*, 3. *Laurel*, common, 1; *Do. Portugal*, 1. *Lavander*, 1. *Lonicera japonica*, 2. *Parsley*, 1. *Pears*, 2 (see below). *Phormium tenax*, 2. *Rhododendrons*, especially late flowering, many kd. to grd., 2. *Sequoia gigantea*, 1. *Spartium junceum*, 1. *Tritoma uvaria*, 1. *Yew*, 2.

Observations—Apples never looked better. Currants, Gooseberries, Raspberries and Strawberries all promise crops above the average. Pears, had a fine appearance in the autumn 1880, with abundance of flower-buds: but most of the buds have been killed. The only sorts carrying any quantity of blossom are *Beurré d'Amanlis*, *Chau-montel*, *Jargonelle* and *Swan's-Egg*.

2. LOCKERBIE, *Jardine Hall*.—Sir A. Jardine. [See p. 127.]

Date of Onset and Duration of Frost, 1880-81 — Frost began in general about middle of Nov. and lasted till end of Jan., with several intervals of thaw. The severest period, from Jan. 6th to 30th.

Min. Temps. and Dates—Jan. 16th, -6°; 17th, -8°; several nights following, 0°, or -1° and -2°.

Plants injured, 1880-81—11 (1), 3 (2), 6 (3)—*Abies Douglasii*, 3. *Aucuba japonica variegata*, 1. *Borecole*, 1. *Broccoli*, 1. *Brussels sprouts*, 1. *Cabbages*, 1. *Cauliflower*, 1. *Cedrus Deodara*, 2. *Cotoneaster microphylla*, 1. *Cryptomeria elegans*, 3. *Holly*, 3; *Do. variegated*, 3. *Kale*, 1. *Laurel*, common, 1; *Do. Portugal*, 1. *Rhododendrons*, 2. *Sequoia gigantea*, 3. *Strawberries*, 2. *Ulex europæus*, 1. *Yew*, 3.

Observations—The greatest amount of damage was done by S.W. winds and sun during the spring.

1. KIRKCUDBRIGHT — AUCHENCAIRN, *Castle Douglas*.—Mr. J. McGuffey. [See p. 128.]

Rainfall, 1880—30.39 ins.

Date of Onset and Duration of Frost — Sharp frosts from Nov. 18th to 20th; Jan. 1881, 5th to 27th; severest winter for 21 years.

Min. Temp. and Date—Jan. 25th, 11°.

Plants injured, 1880-81—6 (1), 1 (2), 4 (3)—*Artichoke*, globe, 3. *Broccoli*, 2. *Cauliflower*, 1. *Celery*, 1. *Echeveria metallica*, 1.

Endive, 1. Lettuce, hardy green and all the year round, 1. Onions, winter, 3. Parsley, 3. Penstemons, 1. Yucca gloriosa, 3.

Observations—All shrubs stood well in this locality, owing to the wood being quite ripe before the frost came; Fruit trees quite uninjured and laden with bloom (May 27th, 1881).

1. ROXBURGH—ST. BOSWELL'S, Mertoun House.—Mr. W. Fowler.
Gen. Char. of Soil; Alt., &c. [See p. 130.]

Rainfall, 1880—31·86 ins.

Date of Onset and Duration of Frost—Oct. 3rd, 29°; Jan. 1881, frost on 27 days; seven times below 0°.

Min. Temps. and Dates—Jan. 17th, -10°; 18th, -4°; 26th, -8°; 27th, -7° 5': [Melrose, dist., 4 ms.; alt., 280 ft.; Jan. 17th, -10°].

Plants injured, 1880-81—39 (1), 19 (2), 8 (3)—*Ampelopsis* *hederacea*, 3; *A. Veitchii*, 3. Apples, 2. Apricots, 3. *Araucaria*, 1. *Arbutus Unedo*, 1. Artichoke, globe, 1. *Aucuba japonica*, 2. *Azalea amæna*, 1. *Bambusa Fortunei*, 2. *Berberis Darwinii*, 3; *B. japonica*, 1. Broccoli, 2. Box, 1. *Buxus balearica*, 1. Cauliflower, 2. *Ceanothus azureus*, 1; *C. dentatus*, 1; *C. grandiflorus*, 1. *Cedrus Atlantica*, 2; *C. Deodara*, 1; *C. Libani*, 2. *Chamærops Fortunei*, 1. *Clematis Jackmanni*, 2. *Colutea arborescens*, 1. *Cotoneaster microphylla*, 2. *Cratægus Pyracantha*, 3. *Cryptomeria elegans*, 2. *Daphne Mezereum*, 1. *Erica*, dwf. sorts, 2. *Escallonia macrantha*, 1. *Eugenia Ugni*, 1. *Euonymus jap.*, 1. *Fabiana imbricata*, 1. *Forsythia elegans*, 1. *Fremontia californica*, 1. Furze, 3. *Garrya elliptica*, 1. Holly, 2; *Do. varieg.*, 2. Ivy, 2. *Jasminum officinale*, 1. Laurel, Bay, 1. Laurel, com., 1; *Do. Port.*, 1. Nectarines, 3. Pampas grass, 2. Peaches, 2. Penstemons, 1. *Phormium tenax*, 1. *Pinus austriaca*, 2. *Rhododendron ponticum*, all, 1 or 2. Roses, dwfs., 1; *H. P.'s*, 1; stands., 1; Teas, 1. *Tritoma uvaria*, 1. *Veronica Andersoni*, 1; *V. salicifolia*, 1. Wallflowers, 1. Yew, many, 1 or 2; *Do.*, most, 3. *Yucca aloifolia*, 1; *Y. filamentosa*, 1; *Y. gloriosa*, 1.

Plants uninjured—*Pinus*, newer vars.; *Rhododendron hybs.*; Yew, vars., *adpressa*, *Dovastonii*, and *elegantissima*.

Observations—The injury is probably not altogether due to the severity of the winter, but to the fact that plants had never thoroughly recovered from the two previous winters as well as the three last summers; the injuries being especially in low lying districts, where all plants making late aut. growth suffered severely.

DIVISION XIII.—(SCOT.) S. E. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881,
FROM BERWICK, EDINBURGH, HADDINGTONSHIRE AND PEEBLES.

BERWICK. *Rainfall*, mean of 5 places, 28·91 ins. Jan. 1881 [frost intensely severe in low lying districts; see *Gard. Chron.* 1881, vol. xv., p. 634]. *Min. temps.*, all on Jan. 17th, *viz.*, Blackadder, -22° [?]:* Chirnside, alt., 100 ft.; -12°: Coldstream, alt., 100 ft.; -12°: Thirlestane Castle, alt., 558 ft.; -11°: Eyemouth, alt., 16 ft.; -1°: and Dunse (Marchmont), alt., 500 ft.; 2°.

Plants injured, 1880-81 — 48 (1), 41 (2), 34 (3), total at 2 places.

EDINBURGH. *Min. rainfall*, Leith, alt., 22 ft.; ht., 1 ft. 8 ins.; 20·62 ins., on 175 days: max., Pentland Hills, alt., 900 [?] ft.; 53·20 ins.; Jan. 1881: *Min. temps.*, Dalkeith, alt., 190 ft.; Jan. 17th, 3°.

Plants injured, 1880-81 — 16 (1), 44 (2), 45 (3), total at 1 place.

HADDINGTON. One of the finest years on record (East Linton).† *Rainfall*, mean of 5 places; 26·29 ins. *Min. temps.*, Jan. 17th; Haddington, alt., 140 ft.; -8°: and Tynninghame, alt., 50 (?) ft., -3°·5.

Plants injured, 1880-81—8 (1), 24 (2), 18 (3), total at 1 place.

PEEBLES. *Rainfall*, mean of 3 places, 39·08 ins. Jan. 1881, *Min. temps.*, Stobo, alt., 600 ft.; Jan. 17th, 18th, -15°: King's Meadow, alt., 540 ft.; Jan. 17th, -15°.

Plants injured, 1880-81—21 (1), 5 (2), 3 (3), total at 1 place.

REPORTS.

1. BERWICK—COLDSTREAM.—Mr. J. Cairns. [See p. 133.]

* Mr. Marriott observes that the therm. did not appear to have been satisfactorily exposed. (*Qr. Jl. of Met. Soc.* 1881, p. 140, note.)

† This is the only observation for this Division recorded in Symons's *Br. Rainfall*.

Raifall, 1880—26·87 ins.

Date of Onset and Duration of Frost—Oct., twelve times below 32°; Nov., 21 times; Dec., 20 times; Jan. 1881, 23 times.

Min. Temps. and Dates—Jan. 13th, 10°; 14th, -11°; 15th, 16th, -3°; 17th, -12° [Kelso, dist., 8 ms., S.W.; alt., 130 ft.; Jan. 17th, -16°].

Plants injured, 1880-81—8 (1), 22 (2), 22 (3)—*Abies Douglasii*, 3. *Ampelopsis hederacea*, 3; *A. Veitchii*, 3. Apricots, 2. *Araucaria imbricata*, 2. Artichoke, globe, 2. *Arundo conspicua*, 3. *Aucuba japonica*, 2. *Berberis Darwinii*, 2. *Biota orientalis*, 3. Borecole, 2. Broccoli, 1. Brussels sprouts, 2. *Buddleia globosa*, 1. Cabbages, 2. Cauliflowers, 2. *Cedrus Deodara*, 3. Celery, 3. *Clematis montana*, old wood killed, 2. *Cupressus Lawsoniana*, 3. *Escallonia macrantha*, 1. *Euonymus japonicus*, 3. *Forsythia viridissima*, 2. Furze, 2. *Garrya elliptica*, 1. Holly, 1, 2. Honeysuckle, 3. Ivy, young wood killed, 3. *Jasminum nudiflorum*, 3. Kale, 2. Laurel, Bay, 1. Laurel, common, 2; Do. Portugal, 2. *Laurustinus*, 2. Lavander, 2. Lettuce, 3. Onions, winter, 3. Pampas grass, 2. Parsley, 2. Pears, 3. *Picea grandis*, 3; *P. pinsapo*, 2. Privet, 3. *Pyrus japonica*, 3. Roses, dwfs., 3; stands., 1; Teas, 1. *Sequoia gigantea*, 3. Strawberries, 3. *Tritoma uvaria*, 2. Wallflowers, 2. *Weigela rosea*, 3. Yew, 3.

Plants uninjured—Cherries, *Chimonanthus fragrans*, Currants, *Daphne Mezereum*, *Erica herbacea*, Gooseberries, Hyacinths, Lilac, Plane, Plums.

Observations—The damage done was not more than in the last winter. Having had more sun in 1880 the wood of fruit-trees &c. was better ripened; while dwarf growing plants, *e.g.* Lettuces, were protected by snow. Hollies suffered very severely, those injured in 1879-80 seem quite dead. The smooth-leaved vars., on the whole, stood best.

2. DUNSE, Marchmont House.—Mr. P. Loney. [See p. 133.]

Rainfall, 1880—37·03 ins.

Min. Temps. and Dates—Dec., 16°; Jan. 17th, 2°; 26th, 27th, 9°.

Plants injured, 1880-81—40 (1), 19 (2), 12 (3)—Almond, 1. *Aloysia citriodora*, 1. Apples, 3. Apricots, 2. *Araucaria imbricata*, 3. *Arbutus Andrachne*, 1; *A. japonica*, 1; *A. Unedo*, 1. *Aristolochia Siphon*, 1. Artichoke, globe, 2. *Aucuba japonica*, 1; Do. *variegata*, 1. *Berberis Darwinii*, 1; *B. japonica*, 3; *B. vulgaris*, 3.

Borecole, 2. Broccoli, 1. Brussels sprouts, 1. *Buddleia globosa*, 1. Cabbages, 1. Carnations, 2. Cauliflower, 1. *Ceanothus azureus*, 1. Celery, 3. Cherries, 3. *Chimonanthus fragrans*, 1. *Clianthus puniceus*, 1. *Cotoneaster microphylla*, 2. *Crataegus Pyracantha*, 2. Currants, 3. *Cytisus Laburnum*, 2. *Deutzia scabra*, 2. Endive, 1. *Eriobotrya japonica*, 2. *Escallonia macrantha*, 1. *Eucalyptus globulus*, 1. *Euonymus japonicus*, 2. *Fabiana imbricata*, 1. *Fuchsia Riccartoni*, 1. *Garrya elliptica*, 1. Holly, 2; Do. variegated, 2. Ivy, 3. *Jasminum nudiflorum*, 3. Laurel, Bay, 1. Laurel, common, 2; Do. Portugal, 1. *Laurustinus*, 1. Lavender, 1. Lettuce, 1. *Leycesteria formosa*, 1. *Lonicera fragrantissima*, 1. *Magnolia grandiflora*, 2. *Menziesia polifolia*, 2. Onions, winter, 1. Pampas grass, 1. *Paulownia imperialis*, 1. *Phormium tenax*, 1. Plums, 3. *Pyrus japonica*, 3. *Quercus glabra*, 3. Quince, 2. Ribes, 2. Rosemary, 1. Roses, dwfs., 3; stands., 1; Tea, 1. *Skimmia japonica*, 1. Stocks, 1. Wallflowers, 2. *Yucca filamentosa*, 1.

Observations—We do not experience such low temperatures as in two or three other places in the county of Berwick; chiefly from our position being a considerable distance from water, and at an elevation of (say) 500 ft. But, on the other hand, we have a long continuance of storms and fewer changes than are experienced in lower lying districts. At Blackadder [see p.309, note], about 150 ft. above the sea, all the evergreens are killed, and many Oaks have suffered severely.

1. EDINBURGH—DALKEITH, Palace Gardens.—Mr. M. Dunn. *Gen. Char. of Soil; Alt., &c.* [See p. 135.]

Rainfall, 1880—24·50 ins.

Date of Onset and Duration of Frost—Oct. 12th, 29°; set in Oct. 19th, 25°; 15 frosts in Nov.; 20 in Dec.; 29 in Jan.; 27 in Feb.; 22 in March; 18 in April; and 5 in May. Mean temp., Jan. was below 32°, from 13th to 18th; max. temp., 29°.

Min. Temp. and Date—Jan. 17th, 3°.

Plants injured 1880-81—16 (1), 44 (2), 45 (3)—*Abies Morinda*, 3. Almond, 3. *Aristolochia Sipho*, 3. *Arundo Donax*, 2. *Azalea amæna*, 2; *A. indica*, 1. Camellias, 2. *Catalpa syringæfolia*, 3; Do. *aurea*, 3. *Ceanothus azureus*, 1; *C. dentatus*, 1. *Clianthus puniceus*, 1. *Colletia ferox*, 2. *Cryptomeria elegans*, 3. *Daphne collina*, 2. *Elæagnus argentea*, 2; *E. pungens*, 3. *Erica*, 1, 2.

Escallonia Ingrami, 2; *E. macrantha*, 2; *E. montevidensis*, 1; *E. rubra*, 2. *Euonymus europæus*, 3; *E. japonicus*, 2; *E. radicans*, 3. *Gleditschia triacanthos*, 3. *Griselinia littoralis*, 2. Laurel, common, 2; *Do. Caucasica*, 3. *Lavatera arborea*, 3. *Leptospermum scoparium*, 2. *Libocedrus chilensis*, 3. *Ligustrum lucidum*, 3; *L. vulgare*, 3. *Menziesia polifolia*, 3. Mulberry, 3. Nectarines, 3. *Negundo fraxinifolia*, 3. *Oreodaphne*, 2. *Paulownia imperialis*, 3. Peaches, 3. Penstemons, 3. *Phillyrea angustifolia*, 3; *P. media*, 3. *Phormium tenax*, 2. *Picea cephalonica*, 3; *P. Pindrow*, 3. *Pinus excelsa*, 3. *Piptanthus nepalensis*, 3. *Pittosporum Tobira*, 3. *Quercus glabra*, 3; *Q. Ilex*, 2. Quince, 3. Rhododendrons, 1, 2, 3. *Santolina chamæcyparis*, 3. *Sequoia sempervirens*, 3. *Spartium junceum*, 3. Stocks, 1. Vines, 2. Walnut, 3.

Observations—Generally speaking trees and shrubs withstood this winter better than the two previous ones. Fruit trees escaped with little or no injury; few shoots of Peaches even being injured. The young wood was so well ripened the previous autumn that all trees and shrubs were in the best possible condition to withstand the rigours of winter. With vegetables, however, the case was different, as they require the protection of snow to save them from such severe frost. Hence, the frequent gales of frosty wind which prevailed in Jan., Feb. and March proved very detrimental to vegetable crops, by drifting the snow off them and exposing them to daily freezing and thawing and the keen blast of cold frosty winds. Brussels sprouts and Leeks are the only crops that came through scatheless. Strawberry plants suffered severely from the same cause as vegetables. Young Cabbages, &c., were entirely swept off by the frosty winds. In April and May, vegetables were scarcer than they have been known for years. Fruit trees flowered profusely and bore heavy crops of fruit, but owing to the cold and wet summer and autumn, the fruit has been deficient in quality and flavour. (Dec. 12, 1881.)

1. HADDINGTON.—PRESTON, Tynninghame. — Mr. R. Brotherton.

Gen. Char. of Soil; Alt., &c. [See p. 141.]

Rainfall, 1880—[Smeaton Ho., dist., 2 ms.; 24·65 ins.].

Date of Onset and Duration of Frost, 1880-81—Oct. 4th, till beg. of April. Mean temp. for Jan. was 8° below av.

Min. Temps. and Dates—Jan. 16th, 3°·5; 17th, -3°·5; 26th, 6°; [Haddington, dist., 7 ms., W.; alt., 140 ft.; Jan. 17th, -8°].

Plants injured, 1880-81—8 (1), 24 (2), 10 (3)—*Arbutus Unedo*, 1, 2. *Artichoke globe*, 2. *Aucuba japonica*, variegata, 3. *Benthamia fragifera*, 2. *Broccoli*, (lifted and laid down to the N. in Oct.), *Veitch's spring white*, only, 1; *Penzance and Snow's winter*, 2. *Cooling's Matchless*, *Dilcock's Bride*, 3. *Cabbages*, 2. *Cauliflowers*, early dwf. *Mammoth* and early *London*, only young plants, 1. *Ceanothus dentatus*, 2. *Endive*, 1. *Escallonia macrantha*, 2; *E. rubra*, 2. *Euonymus radicans*, 3. *Figs*, 2. *Fuchsia gracilis*, 1. *F. Riccartoni*, 2. *Furze*, 2. *Garrya elliptica*, 2. *Hypericum Calycinum*, 3. *Ivy*, 2, 3. *Kale*, 3. *Laurel*, Bay, 2. *Laurel*, common, 3. *Do. Portugal*, 3. *Laurustinus*, 2. *Leycesteria formosa*, 2. *Myrtle*, 2. *Onions*, winter, 2. *Pampas grass*, 2. *Paulownia imperialis*, 2. *Pyrus japonica*, one-half of one plant, 1. *Rhododendrons*, small plants of new kinds and seedlings, 3. *Roses*, dwfs., 2; *H.P.'s*, 2 (young wood of last season least hurt); *Teas* (excepting *Gloire de Dijon*), 2. *Stocks*, 1. *Strawberries*, 3 yr. old plants, *Green's Scarlet* and *Lucas*, none damaged; other sorts more or less injured, *Loxford Hall* and *Pioneer*, 1; two yr. old plants, only, of *Loxford Hall* seedlings injured; other sorts, *Helena Gloede*, *James Veitch*, *Lucas*, *President*; one-yr. old plants (Aug. 1880) none damaged. *Tritoma uvaria*, 2.

Plants uninjured—*Broccoli*, lifted and laid to N. in Oct., *Eclipse*, *Goschen's late white*, *Leamington*, *Model*; *Lettuce*, *Brown Dutch*, *Hammersmith*, *Hick's hardy*; *Plums*, all on walls, *Black pendragon*, *Bullace*, *Golden drop*, *Greengage*, *Ickworth Impératrice*, *Reine Claude de Bavay*, *Victoria*, *Washington*, *White Magnum Bonum*; *Strawberries*, three yr. old plants of *Green's Scarlet* and *Lucas*, one yr. old plants of *Helena Gloede*, *James Veitch*, *Lucas*, *President*.

Observations—The effects of the frost can hardly be localised, as within a radius of six miles the results have varied to a most remarkable degree. In one instance notably, nothing whatever was damaged; while in another case every common shrub was killed to the ground, and others injured to various extents.

1. **PEEBLES—KING'S MEADOWS.**—Mr. D. McFarlane. [See p. 142.]

Rainfall, 1880—[Mean. of 3 places, 39·08 ins.].

Date of Onset and Duration of Frost—Hard frost in Nov.; from Dec. 24th, till April 24th, only 20 nights without frost.

Min. Temps. and Dates—Jan. 16th, -13°; 17th, -15°; 22nd, -6°;

24th, -7° ; 26th, -8° . [Stobo, dist., 6 ms., W.; ht., 600 ft.; Jan. 17th, 18th, -15° .]

Plants injured, 1880-81—21 (1), 5 (2), 3 (3)—Artichoke, globe, 3. Asparagus, 3. Borecole, Scotch curly, 1. Broccoli, Back-house's, Gordon's and Lander's, 1. Brussels sprouts, 1. Cabbages, 1. Carnations, 1. Cauliflower, dwf. Erfurt, London, 1. Celery, Laing's Mammoth, Manchester, 1. Cupressus Lawsoniana, Forsythia elegans, 1. Gladiolus, 1. Gooseberries, 2. Hollies, 1; Do. variegated, 1. Ivy, 2. Laurels, common, 1; Do. Portugal, 1. Lavander, 1. Onions, winter, 1. Parsley, 1. Privet, 1. Rhododendrons, ponticum and catawbiense, many, 1, 2. Rosemary, 1. Roses, H.P.'s, many, 1, 2. Sequoia gigantea, 2. Strawberries, Duke of Edinburgh, Keyne's Black Prince, Oscar, President, 2. Yew, Irish, 2.

DIVISION XIV.—(SCOT.) S. W. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881, FROM AYR AND LANARK.

AYR. *Rainfall*, nearly 9 ins. below av. of 14 yrs. (Pinmore).
Jan. 1881. *Min. temp.*, Ardrossan, alt., 14 ft.; Jan. 17th, 5° .

LANARK. The season very favourable and crops good (Bothwell Castle). *Min. rainfall*, Bothwell Castle, alt., 146 ft.; ht., 18 ft.; 23·45 ins., on 135 days: max., Douglas (Newmains), alt., 783 ft.; 43·58 ins., on 187 days. *Min. temps.*, Lanark, alt., 630 ft.; Jan. 16th, -5° : Cambuslang, alt., 146 ft.; Jan. 16th, -2° : Bothwell Castle, Jan. 14th, 1° : Glasgow, alt., 190 ft.; Jan. 16th, 8° ·9.

Plants injured, 1880-81 — 73 (1), 50 (2), 31 (3), total at 2 places.

REPORTS.

1. LANARK—Bothwell Castle.—Mr. A. Turnbull. [See p. 145.]
Date of Onset and Duration of Frost—Oct. 4th, 22° ; 20th, 13° ;

frost all through Nov. ; Dec. comparatively mild, till 17th. Jan. 1881, as a whole, intensely cold.

Min. Temps. and Dates—Jan. 14th, -1° ; 16th, -7° ; 17th, -6° ; 20th, -2° ; 22nd, -4° ; and 24th, $-3^{\circ}5$.

Plants injured, 1880-81—23 (1), 12 (2), 1 (3)—*Abies Douglasii*, 2. *Aloysia citriodora*, 1. *Araucaria imbricata*, 2. *Arbutus Andrachne*, 1; *A. Unedo*, 1. *Aucuba japonica*, 3. *Azalea amæna*, 1. *Berberis Darwinii*, 1. *Borecole*, 1. *Broccoli*, all, 1. *Brussels sprouts*, 1. *Cabbages*, of 200 autumn planted, all (but 66), 1; *Savoys and German greens*, 1. *Camellias*, 1. *Carnations*, 1. *Cedrus Deodara*, 1. *Clematis Jackmanni*, 2. *Furze*, 1; *Do. fl. pl.*, 1. *Garrya elliptica*, 1. *Jasminum nudiflorum*, 2. *Kale*, 1. *Laurel*, common, 2; *Do. Portugal*, 2. *Laurustinus*, 1. *Lavander*, 1. *Lonicera japonica*, 1. *Nectarines*, 2. *Parsley*, 1. *Peaches*, 2. *Rhododendrons*, 2; *R. ponticum* has fl. buds, 1. *Rosemary*, 1. *Roses*, dwfs., 2; *H. P.'s*, 2; stands., 1; *Teas* (except *Gloire de Dijon*), 1. *Sequoia gigantea*, 2. *Stocks*, 1. *Wallflowers*, 1.

2. GLASGOW, [Locality omitted].—Mr. R. Bullen.

Gen. Char. of Soil—In the neighbourhood of Glasgow we have the worst possible soil and climate to contend against.

Rainfall, 1880—[Glasgow Obs., alt., 180 ft. ; 32·65 ins.].

Min. Temp. and Date—[Jan. 16th ?], -2° .

Plants injured, 1880-81—50 (1), 38 (2), 30 (1)—*Abies Douglasii*, 2; *A. Morinda*, 1, 2. *Araucaria imbricata*, 1, 2, 3. *Asparagus*, 1. *Aucuba japonica*, 3; *Do. varieg.*, 3. *Bambusa Fortunei*, 1. *Benthamia fragifera*, 1, 2. *Berberis Darwinii*, 1; *B. vulgaris*, 3. *Biota orientalis*, 3. *Boehmeria nivea*, 1. *Boussingaultia*, 1. *Buddleia globosa*, 2. *Bupleurum fruticosum*, 2. *Camellias*, 1. *Carnations*, 2. *Catalpa syringæfolia*, 1; *Do. aurea*, 1. *Cedrus Atlantica*, 2; *C. Deodara*, 2; *C. Libani*, 2. *Cephalotaxus Fortunei*, 1. *Cercis siliquastrum*, 1, 2. *Choisya ternata*, 1. *Clematis montana*, 3. *Colutea arborescens*, 3. *Cotoneaster microphylla*, 3; *C. Simonsii*, 3. *Cryptomeria elegans*, 1; *C. japonica*, 1. *Cupressus borealis*, 2; *C. Lambertiana*, 1; *C. Lawsoniana*, 2; *C. macrocarpa*, 1. *Eriobotrya japonica*, 1. *Escallonia macrantha*, 1; *E. rubra*, 1. *Euonymus japonicus*, 2; *E. radicans*, 2. *Fitzroya patagonica*, 2. *Forsythia viridissima*, 3. *Fuchsia Riccartoni*, 3. *Furze*, 2; *Do. fl. pl.*, 2. *Garrya elliptica*, 2. *Gladiolus*, 1. *Grevillea rosmarinifolia*, 1, 2. *Gunnera scabra*, 1. *Hibiscus syriacus*, 1, 2. *Hydrangea arbores-*

cens, 3; *H. Hortensia*, 3; *H. Otaksa*, 3. *Holly varieg.*, 3. *Ivy*, 2; *Do. varieg.*, 2. *Jasminum nudiflorum*, 3; *J. officinale*, 3. *Juniperus*, 1, 2. *Kalmia latifolia*, 2. *Larch*, 1, 2, 3. *Laurel*, Bay, 1. *Laurel*, common, 2; *Do. Portugal*, 1, 2. *Laurustinus*, 1. *Lavander*, 1. *Leycesteria formosa*, 3. *Libocedrus chilensis*, 2. *Ligustrum lucidum*, 3. *Lilium auratum*, 1; *L. excelsum*, 1; *L. lancifolium*, 1. *Liquidambar styraciflua*, 2. *Lonicera japonica*, 1. *Magnolia grandiflora*, 1. *Mulberry*, 3. *Olearia Haastii*, 2. *Osmanthus aquifolius*, 1; *O. ilicifolius*, 1. *Pampas grass*, 1. *Paulownia imperialis*, 2. *Penstemons*, 1. *Phormium tenax*, 1. *Picea lasiocarpa*, 1; *P. Nordmanniana*, 2. *Picea Pinsapo*, 2. *Pinus excelsa*, 3; *P. halepensis*, 3; *P. insignis*, 3; *P. Laricio*, 2; *P. pinea*, 2; *P. sylvestris*, 3. *Pottosporum Tobira*, 1. *Pyrus japonica*, 3. *Rhododendron ponticum* and hybs. from pont., 2. *Rhus glabra*, 3. *Ribes*, 3. *Rosemary*, 1. *Roses*, H. P.'s, 2. *Ruscus aculeatus*, 3. *Sequoia gigantea*, 1. *Skimmia japonica*, 1. *Tritoma uvaria*, 1. *Veronica Andersoni*, 1; *V. Traversi*, 1. *Wallflowers*, 1. *Yew*, 1, 2; *Do. Irish*, 3.

Plants uninjured—Almond, *Ampelopsis hederacea*, *A. Veitchii*, *Aristolochia Siphon*, Box, *Buxus balearica*, *Castanea vesca*, *Clematis Jackmanni*, *Cratægus ox.*, fl. pl., *C. Pyracantha*, Currants, *Cytisus Laburnum*, *Daphne Laureola*, *D. Mezereum*, *Deutzia scabra*, *Euonymus europæus*, Gooseberries, *Holly*, *Hyacinths*, *Hypericum balearicum*, *H. Calycinum*, *Iris*, *Lilac*, *Mensesia polifolia*, *Medlar*, *Narcissus*, *Plane*, *Privet*, *Quercus glabra*, *Q. Ilex*, *Q. robur*, *Q. Suber*, *Quince*, *Retinospora obtusa*, *R. pisifera*, *Rhododendron catawbiense* and its hybs., *Weigela rosea*.

Observations—In the higher and most exposed parts of the garden we have in a large bed devoted to Coniferæ, two trees of *Araucaria imbricata*, 60 yards apart, 8 years old. Both continued in good health till the last two winters. The one at the W. end of the bed was somewhat sheltered by trees and suffered most; the other being more exposed suffered but little. Elsewhere are two others, 20 yards apart, one is quite dead, the other slightly injured, both being much exposed. There are elsewhere other two plants, both much sheltered by large trees, and both are killed. The living plants have their roots nearest to the surface, and the junction of the stem with the roots well above ground; while those planted deepest are those which succumbed first. The deeper the roots are the more succulent and tender are they; and the frost

having penetrated to an unusual depth this winter killed these roots completely in many cases. This fact applies to many other plants; so that the more the surface-roots are encouraged, the better it is for the plant in winter. We had occasion to transplant a great many shrubs last autumn, and having an abundant supply of leaf-mould only partially decomposed, it was freely applied about the roots, mixed with the ordinary soil. The consequence was that they withstood the severe winter much better than similar plants which have been established for years.

DIVISION XV.—(SCOT.) W. MIDLAND COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881, FROM ARGYLL, DUMBARTON AND STIRLING.

ARGYLL. *Rainfall*, least, and sum. driest since 1868 (Skipness). Do., 8.92 ins., below av. of 30 yrs. (Mull of Cantire). Sum., fine, most abundant harvest, end of year very mild (Islay). Jan. 1881, *Min. temps.*, Lochgilphead, alt., 65 ft.; Jan. 15th, 5°: Eallabus, alt., 71 ft.; Jan. 16th, 22nd, 8°.4: Kilmory, alt., 200 ft.; Jan. 16th, 10°: Rothesay, alt., 116 ft.; Jan. 16th, 15°.

Plants injured, 1880-81 — 29 (1), 58 (2), 52 (3), total at 2 places.

DUMBARTON. Unusually dry season (Auchendennan); Jan. 1881, *Min. temp.*, Auchendennan, Jan. 15th, 1°.

Plants injured, 1880-81—5 (1), 9 (2), 7 (3), total at 1 place.

STIRLING. Year, fine and dry (Polmaise Gardens). Jan. 1881, *Min. temp.*, Falkirk, alt., 8 ft.; Jan. 17th, 0°.

Plants injured, 1880-81—6 (1), 6 (2), 17 (3), total at 1 place.

REPORTS.

1. ARGYLL—LOCHGILPHEAD, Kilmory.—Mr. A. Brown.

Gen. Char. of Soil; Alt., &c. [See p. 148.]

Rainfall, 1880—49·12 ins.

Date of Onset and Duration of Frost—First frost Oct. 3rd; last, May 3rd.

Min. Temp. and Date—Jan. 16th, 10°.

Plants injured, 1880-81—17 (1), 26 (2), 17 (3)—*Aristolochia sempervirens*, 2. *Artichoke*, globe, 2. *Berberis* (*Mahonia*) *acanthifolia*, 1. *Buddleia Lindleyana*, 2. *Clianthus puniceus*, 2. *Colletia horrida*, 2; *C. spinosa*, 2. *Cryptomeria elegans*, 3. *Cupressus torulosa*, 3. *Desfontainea spinosa*, 3. *Deutzia scabra*, 3. *Elæagnus argentea*, 3. *Escallonia Ingrami*, 2; *E. macrantha*, 2; *E. pterocladon*, 2. *E. rubra*, 1. *Eurybia ilicifolia*, 2; *E. Gunnii*, 2. *Fuchsia coccinea*, 2; *F. Riccartoni*, 2. *Griselinia littoralis*, 3. *Gunnera scabra*, 3. *Hartogia capensis*, 2. *Leptospermum lanigerum*, 2; *L. scoparium*, 3. *Libertia fruticosa*, 1. *Menziesia polifolia*, 3. *Mitrorhia coccinea*, 2. *Phygellus capensis*, 2. *Piptanthus nepalensis*, 3.

2. LOCHGILPHEAD, Poltalloch.—Mr. J. Russell. [See p. 148.]

Rainfall, 1880—42·17 ins.

Date of Onset and Duration of Frost—Oct. 4th, 24°; last frost, June 11th, 31°.

Min. Temp. and Date—Jan. 15th, 5°.

Plants injured, 1880-81—12 (1), 32 (2), 35 (3)—*Abies Morinda*, 3. *Ampelopsis Veitchii*, 2. *Bambusa gracilis*, 2. (*B. Metake*, unhurt.) *Berberidopsis corollina*, 3. *Broccoli*, autumn, Backhouse's winter, Dilcock's bride, Late white protecting, Lander's Goschen, Snow's superb winter white, Sutton's perfection, Veitch's self-protecting, 1. *Cabbages*, 2. *Carnations*, 2. *Cauliflower*, 1. *Ceanothus azureus*, 2; *C. integerrimus*, 2. *Cedrus Deodara*, 3. *Chimonanthus fragrans*, 3. *Coronilla glauca*, 1. *Cryptomeria elegans*, 3; *C. japonica*, 3. *Cupressus torulosa*, 3. *Desfontainea spinosa*, 2. *Endive*, 1. *Erica herbacea*, 2; *E. mediterranea*, 2. *Eugenia Ugni*, 1. *Euonymus radicans*, 3. *Fuchsia Riccartoni*, 2. *Juniperus chinensis*, 3. *Lettuce*, Hick's hardy white, hardy Hammersmith, 1. *Osmanthus ilicifolius*, 3. *Phillyrea angustifolia*, 3. *Picea grandis*, 3; *P. lasiocarpa*, 3. *Pinus excelsa*, 3; *P. Laricio*, 3. *Podocarpus andina* 3;

P. chinensis, 3. *Pyrus japonica*, 2. *Quercus glabra*, 3. *Raphiolepis ovata*, 2. *Retinospora pisifera aurea*, 3. *Rhododendrons*, Countess of Haddington, 1; *R. Falconeri*, 2. Strawberries, almost all rendered leafless, Dr. Hogg, Garibaldi, Keen's seedling, President, Sir Joseph Paxton, Vicomtesse Héricart de Thury, Wizard of the North. Violets, 2. *Yucca recurva*, 3.

1. DUMBARTON — ALEXANDRIA, Auchendennan. — Mr. A. Scott.
Gen. Char. of Soil; Alt., &c. [See p. 149.]

Rainfall, 1880—38·5 ins.

Date of Onset and Duration of Frost—Jan. 5th till Feb. 2nd, with subsequent slight frosts.

Min. Temp. and Date—Jan. 15th, 1°.

Plants injured, 1880-81—5 (1), 9 (2), 7 (3)—*Araucaria imbricata*, 3. *Arbutus Unedo*, 1. Artichoke, globe, 2. *Asparagus*, 3. *Berberis Darwinii*, 2. Borecole, 2. Broccoli, 1. Brussels sprouts, 2. Cabbages, 2. Celery, 2. *Cryptomeria elegans*, 3; *C. japonica*, 3. *Cupressus Lambertiana*, 3. *Escallonia macrantha*, 1. *Garrya elliptica*, 2. Laurel, Bay, 1. Laurel, common, 3. *Laurustinus*, 2. Lettuce, 1. *Leycesteria formosa*, 1. Parsley, 2. Penstemons, 1. Roses, H. P.'s, 2. Strawberries, 2.

1. STIRLING—FALKIRK, Kerse House.—Mr. T. Weir. [See p. 152.]

Rainfall, 1880—26·6 ins.

Date of Onset and Duration of Frost—Oct. 4th; last frost, May 17th.

Min. Temp. and Date—Jan. 17th, 0°.

Plants injured, 1880-81—6 (1), 6 (2), 17 (3)—Apricots, 3. *Araucaria imbricata*, 3. *Aucuba japonica*, 3. *Berberis Darwinii*, 2. Broccoli, Cattell's eclipse and William's Alexandra, 1. Brussels sprouts, 3. Cabbages, 1. Cauliflower, London early, 1. *Cedrus Deodara*, 2. *Cryptomeria japonica*, 3. *Echeveria metallica*, 1. *Fuchsia Riccartoni*, 3. Holly variegated, 3. Ivy, 3. Laurel, Bay, 1. Laurel, common, 2; Do. Portugal, 3. *Libocedrus decurrens*, 3. Onions, winter, 1. *Picea lasiocarpa*, 3; *P. Nordmanniana*, 3. *Picea Pinsapo*, 3. *Podocarpus andina*, 3. *Quercus Ilex*, 3. Roses, dwfs., 2; stands. on briar, 2; Teas, 2. *Sequoia gigantea*, 3. *Taxodium distichum*, 3. Wallflowers, 3.

DIVISION XVI.—(SCOT.) E. M. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881,
FROM FIFE, FORFAR AND PERTH.

FIFE. *Min. rainfall*, Leuchars, alt., 100 ft.; ht., 9 ins.; 20·49 ins.: max., Lothrie Res., alt., 700 ft.; ht., 1 ft.; 34·33 ins. Jan. 1881, severe frosts from end of Oct. to end of March (St. Fort). *Min. temps.*, Colinsburgh, alt., 350 ft.; Jan. 17th, 4°: Kemback, alt., 98 ft.; Jan. 17th, 7°·5.

Plants injured, 1880-81 — 37 (1), 33 (2), 31 (3), total at 2 places.

FORFAR. *Rainfall*, below av. of 30 yrs. (Arbroath, Craigton, &c.) Jan. 1881. *Min. temp.*, Carnoustie, alt., 288 ft.; Jan. 17th, 2°.

Plants injured, 1880-81—8 (1), 9 (2), 7 (3), total at 1 place.

PERTH. Singularly dry year (Callander, Leny). *Min. rainfall*, Perth, alt., 79 ft.; ht., 64 ft. 5 ins.; 23·43 ins.: max., Glengyle, alt., 380 ft.; 69 ins. Jan. 1881, frost severer and longer than known for many yrs. (Aberfeldie). First 3 months, severe, well-grown elms, 30 to 40 yrs. old, split up by frost (Callander, Leny). *Min. temps.*, Abercairny, alt., 200 ft.; Jan. 17th, -5°: Carse of Gowrie, alt., 233 ft.; Jan. 10th, low ground, -4°; higher, 4°: Huntingtowerfield, alt., 45 ft.; Jan. 14th, 17th, 24th, -2°: Ochertyre Ho., alt., 360 ft.; Jan. 17th, 0°: Glen Almond, alt., 533 ft.; Jan. 13th, 7°·9.

Plants injured, 1880-81 — 39 (1), 53 (2), 38 (3), total at 5 places.

REPORTS.

1. FIFE—COLINSBURGH.—Mr. E. Tate. [See p. 154.]

Rainfall, 1880—32·46 ins.

Date of Onset and Duration of Frost — End of Oct., more or less till 1881; then severe frost from about Jan. 9th to 27th.

Min. Temp. and Date—Jan. 17th, 4°.

Plants injured, 1880-81—24 (1), 19 (2), 12 (3)—*Aralia Sieboldii*, sheltered, 3. *Arbutus Andrachne*, sheltered, 3. *A. Unedo*, 1. *Ceanothus americanus*, 1; *C. azureus*, 1; *C. dentatus*, 2. *Clianthus puniceus*, 1. *Cupressus Lawsoniana*, 3. *Dracaena australis*, 1. *Escallonia macrantha*, 1; *E. rubra*, 2. *Eurybia argophylla*, 1; *E. ilicifolia*, 1. *Fuchsia Riccartoni*, 1. *Gladiolus*, 1. *Gleditschia horrida*, 3. *Grevillea rosmarinifolia*, 2. *Griselinia littoralis*, 2. Peaches, 2. *Quercus Suber*, 1. *Rhododendrons*, 3. Roses, dwfs., H. P.'s, and Teas, all much cut, 2; stands. suffered most. *Salisburia*, 1. *Taxodium distichum*, 3.

Observations — The winter has been very severe and we have suffered much in Conifers, Fruit trees, Shrubs and Vegetables. Of Broccolis, the kinds that stood best were Blackhouse's winter, May Queen and Lang's late white. *Chamærops Fortunei*, in open, unhurt.

2. NEWPORT, St. Fort.—Mr. W. Conacher. [See p. 154.]

Rainfall, 1880—[Dundee, dist., 4 ms.; alt., 50 ft.; ht., 6 ins.; 21·05 ins., on 154 days].

Date of Onset and Duration of Frost—About the middle of Nov. to end of March, with but three intervals of a day or two, severe frosts and snow prevailed.

Min. Temps. and Dates—[Carse of Gowrie, dist. 10 ? ms., N.; Jan. 10th, -4° to 4°].

Plants injured, 1880-81—13 (1), 14 (2), 19 (3)—*Arbutus procera*, 3. *Buddleia Lindleyana*, 1. *Clianthus puniceus*, 1. *Cotoneaster microphylla*, 3. *Cryptomeria japonica*, 3. *Cupressus torulosa*, 3. *Daphne Laureola*, 3. *Echeveria metallica*, 1. *Escallonia macrantha*, 3; *E. rubra*, 2. *Euonymus japonicus*, 2; *E. radicans*, 3. *Fuchsia Riccartoni*, 2. *Habrothamnus* on wall, 2. Lettuce, Drum-head, 1 (Brown Dutch safe). *Picea Pinsapo*, lost young shoots, 2. *Quercus Ilex*, 2. *Rhododendrons*, exposed to winds, 3. Roses, H.P.'s and stands., 1. Rosemary, 1. *Ruscus aculeatus*, 3. *Skimmia japonica*, 3. Strawberries, 3. *Veronica Andersoni*, green and variegated, except under protection, all, 1. *Yucca aloifolia*, 3; *Y. filamentosa*, 2.

Observations — The early flowering *Rhododendrons* have been superb. Many Indian sorts have stood well and some have flowered, having been raised from seed many years ago. Fruit trees of all sorts have a great show of flower. Peaches on open wall, most

abundant. Great want of all Brassica tribe for cutting; but Asparagus, Brown Dutch Lettuces, Leeks, Parsley, Rhubarb and Sea-kale are fresh and good. (May 21, 1881.)

1. FORFAR—CARNOUSTIE.—Mr. J. Mitchell. [See p. 155.]

Rainfall, 1880—Ht., 390 ft.; 29.66 ins.

Date of Onset and Duration of Frost—Severe frost in October, 10°; Jan. 8th to Feb. 12th. Frosts also in March, April, and on May 16th, 26°.

Min. Temp. and Date—Jan. 17th, 2°.

Plants injured, 1880-81 - 8 (1), 9 (2), 7 (3) - Abies Morinda, 3. Arbutus Andrachne, 1. Aucuba japonica, 3. Berberis Darwinii, 2. Cupressus torulosa, 2. Daphne Mezereum, 1. Deutzia scabra, 2. Escallonia macrantha, 1. Forsythia viridissima, 2. Furze, 2; Do. fl. pl., 2. Jasminum nudiflorum, 3; J. officinale, 3. Laurel, Bay, 3. Laurel, common, 2; Do. Portugal, 3. Laurustinus, 1. Leycesteria formosa, 1. Parsley, 2. Phormium tenax, 2. Sequoia gigantea, 2. Stocks, 1. Veronica salicifolia, 1. Wallflowers, 1.

Observations—The heavy rainfall of 1879 followed by hard frost when the trees were full of leaf did more damage than has been done this past winter of 1880-81, notwithstanding all the frost and snow we have had. In most cases where the trees and shrubs have been killed this winter, they had been dying since the last. Cedrus Deodara, trees 28 yrs. old, from seed, planted 40 yards apart in a narrow glen 50 ft. deep, had scarcely a twig injured. Others from 70 to 100 ft. higher up, two rows of them are very much cut up. Escallonia macrantha, plants against walls in different aspects, which have stood every winter since 1854, have all died during the last three winters. Fruit trees, *e. g.*, Apples, Cherries, Pears, Plums, have stood this winter uninjured. The wood was better ripened by the dry summer of last year than it has been for many years. They have blossomed strongly and abundantly. Rhododendrons, Himalayan, raised from seed in 1853, were large bushes in 1870; much injured in 1879-80, are now, nearly dead, except those on the very highest part of the grounds, with no shelter whatever. Roses, Gloire de Dijon, on S. wall, kd. nearly to grd.; on a terrace, 35 ft lower down, scarcely injured, and are now growing luxuriantly.

1. PERTH—CARSE OF GOWRIE.—Mr. P. Loney. [See p. 157.]

Rainfall, 1880—25·32 ins.

Date of Onset and Duration of Frost—Nov. 2nd, weather changeable till Dec.; much snow; frost till March 5th.

Min. Temps. and Dates—Jan. 8th, 6°; 10th, 4°; 24th, 9°. In some situations in low ground, -2° to -4°.

Plants injured, 1880-81—4 (1), 7 (2), 2 (3)—*Aralia Sieboldii*, 2. *Aristolochia Siphon*, 2. Artichoke, globe, 2. *Arundo conspicua*, 1. *Berberis Darwinii*, 2. Borecole, 2. Broccoli, 1. Brussels sprouts, 2. Cabbages, 2. Celery, 2. *Chimonanthus fragrans*, 2. *Clematis Jackmanni*, 2. *Eurybia argophylla*, 2; *E. latifolia*, 2; *E. ilicifolia*, 2. *Fuchsia Riccartoni*, 2. Furze, 2. Kale, 2. *Laurustinus*, 3. *Phormium tenax*, 1. Stocks, 1. *Veronica Andersoni*, 3; *V. salicifolia*, 2. Wallflowers, 3.

Observations—In consequence of the elevation and aspect of the grounds, temps. average higher than in low grounds, *e.g.* *Araucarias*, *Cupressus mac.* and vars. of *Rhododendrons* stand well without much injury.

2. CRIEFF, Abercairny.—Mr. J. Brown. [See p. 157.]

Rainfall, 1880—[Crieff (Ochertyre), alt., 325 ft.; 31·28 ins.].

Min. Temp. and Date—Jan. 17th, -5°.

Plants injured, 1880-81—9 (1), 6 (2), 13 (3)—*Araucaria imbricata*, 3. *Arbutus Andrachne*, 3. Artichoke, globe, 3. Borecole, 2. Broccoli, part laid, but all, 1. Brussels sprouts, Scrymger's Giant and Dalkeith, all, 1. Cabbages, 2. *Cedrus Atlantica*, 3. Celery (*Leicester red* only saved), others, 1. *Cotoneaster microphylla*, 3. Endive, 1. *Fuchsia Riccartoni*, 3. Kale, 2. Laurel, Bay, a few kd. to grd., 2, 3. Laurel, common, 2; Do. Portugal, 3. *Laurustinus*, 3. Lettuce, 1. Onions, winter, 3. Penstemons, 1. *Rhododendron Nobleanum*, 1, 2; *P. ponticum*, 3. Roses, dwfs., H. P.'s, stands. and Teas, 3. Stocks, 1. Strawberries, 3. Wallflowers, 2.

Observations—Last sum. and aut. were particularly fine, so that the fruit trees &c. were well ripened; hence, doubtless, was the small amount of damage done this winter.

3. CRIEFF, Ochertyre House.—Mr. G. Croucher. [See p. 158.]

Rainfall, 1880—31·28 ins.

Date of Onset and Duration of Frost—Nov. 15th till April 1st, 137 days. The thickness of the ice on a pond was 13·25 ins., Jan. 17th; on March 5th, 16 ins.

Min. Temps. and Dates—Jan. 17th, 0°; 14th and 18th, 4°; 27th, 3°.

Plants injured, 1880-81—12 (1), 10 (2), 7 (3)—*Araucaria imbricata*, 3. Artichoke, globe, 1, 2. *Berberis Darwinii*, 3. Celery, 1. Clematis Jackmanni, 2. *Cryptomeria*, 2 of 6 plants, 2. *Cupressus macrocarpa*, 1. Endive, 1. *Escallonia macrantha*, 2; *E. rubra*, 2. *Fitzroya patagonica*, 3. Furze, in woods, 2. Kale, 1. Laurel, Bay, 3. Lettuce, 1. Onions, winter, 2. *Osmanthus aquifolius*, 2; *O. ilicifolius*, 2. Parsley, triple-curved, 3. *Picea Pindrow*, 1. *Pinus insignis*, 3. Spinach, winter, 2. *Tritoma uvaria*, 3.

4. PERTH, Balgowan.—Mr. J. Fairlie. [See p. 159.]

Rainfall, 1880 — [Perth, alt., 24 ft.; ht., 1 ft. 6 ins.; 31·30 ins.].

Min. Temps. and Dates—[Carse of Gowrie, dist., 15 ? ms., E.; alt., 233 ft.; Jan. 10th, -4° to 4°: Glen Almond, dist., 15 ? ms., W.; alt., 533 ft.; Jan. 13th, 7°·9].

Plants injured, 1880-81—1 (1), 6 (2), 4 (3)—*Araucaria imbricata*, 2. Artichoke, globe, 2. Asparagus, much better than in 1879-80. Brussels sprouts, 2. *Buddleia globosa*, 2. Cabbages, 3. *Cryptomeria elegans*, 3. *Escallonia macrantha*, 3. *Garrya elliptica*, on S. wall, 20 ft., 2. Roses, stands., 3; Tea, 1. *Tritoma uvaria*, 2.

5. PERTH, Huntingtowerfield.—Mr. A. Bayne. [See p. 159.]

Rainfall, 1880—25·5 ins.

Date of Onset and Duration of Frost—Dec. 14th, first frost lasted till March 18th.

Min. Temps. and Dates—Jan. 14, 17th and 24th, -2°, four ft. from ground; -8° on the ground.

Plants injured, 1880-81—13 (1), 14 (2), 11 (3)—*Araucaria imbricata*, 2. Asparagus, 2. *Aucuba japonica*, 2; *Do. variegated*, 2. *Azalea indica*, 3. *Bambusa Fortunei*, 1. *Berberis Darwinii*, 1. *Biota orientalis*, 3. Borecole, 1. Broccoli, Cooling's matchless, Dilcock's bride, Elletson's mammoth, Lander's protecting white, Goshen, Penzance, all, 1. Brussels sprouts, 1. Cabbages, 1. Carnations, 1. Cauliflower, Erfurt dwarf, London early, Stadtholder, all, 1. *Cedrus Deodara*, 2; *C. Libani*, 3. Celery, 1. *Cotoneaster microphylla*, 3. *Cryptomeria elegans*, 2; *C. japonica*, 2. *Daphne Mezereum*, 1. Erica, most sorts, 3. *Eugenia Ugni*, 3. Holly, 2; *Do. varieg.*, 2. Hyacinths, 3. *Jasminum officinale*, 1. Laurel, common, 2; *Do. Portugal*, 2. Onions, winter, 2. Parsley, 1. Privet, 2. Rhododendrons, hybs., 3. Roses, dwfs. and H. P.'s on Manetti and own roots, 2. *Sequoia gigantea*, 3. Wallflowers, 1. Yew, 3; *Do. Irish*, 3.

Observations—The winter of 1880-81 has been the most severe and protracted in all my experience of 40 years. The nearest approach to it was 1860-61; but the results have been more disastrous during the past winter. The place here has the appearance as of a scorching fire having passed over it. Most of our shrubs that were considered quite hardy are all browned on the side next the sun. Laurels of all sorts will have to be cut down to the ground. The whole of the Brassica tribe was completely killed; in fact we had no green vegetables left except Leeks, a few Onions and Spinach. Fruit trees were well ripened last autumn, consequently they have escaped unhurt. All sorts have an abundant appearance of blossom but are very late (May 31st, 1881).

DIVISION XVII.—(SCOT.) N. E. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881, FROM ABERDEEN, BANFF AND ELGIN.

ABERDEEN. *Rainfall*, small in Aug.; snow heavy in Dec. Jan. 1881, *Min. temps.*, Braemar, alt., 1114 ft.; Jan. 17th, -4° : Aberdeen, alt., 86 ft.; Jan. 17th, 4° .

BANFF. *Rainfall*, Tomintoul, alt., 1103 ft.; 31·53 ins., on 172 days; Jan. 1881, frost most intense during the whole month (Tomintoul). Very fine growing season to end of Sept.; cold, wet and stormy with frequent snow-storms to end of 1880 (Gordon Castle). Jan. 1881; *Min. temp.* do., alt., 90 to 120 ft.; Jan. 18th, 0° .

Plants injured, 1880-81 — 19 (1), 21 (2), 28 (3), total at 1 place.

ELGIN. Intense frost set in Oct. 18th, with snow 11 ins.; grd. could not be dug until April 6th (Dunphail). *Min. Rainfall*, Forres, alt., 20 ft.; ht., 1 ft.; 20·65 ins., on 123 days: max., Aberlour (Elchies), alt., 560 ft.; ht., 1 ft. 6 ins.; 32·81 ins., on 148 days.

Plants injured, 1880-81 — 55 (1), 33 (2), 15 (3), total at 2 places.

REPORTS.

1. BANFF—FOCHABERS, Gordon Castle.—Mr. J. Webster.

Gen. Char. of Soil; Alt., &c. [See p. 165.]

Rainfall, 1880—28·99 ins.

Date of Onset and Duration of Frost—Nov. 20th, sharp frost and snow-storm, with little intermission till end of March.

Min. Temps. and Dates—Jan. 18th, 0°; March 22nd, 10°.

Plants injured, 1880-81—19 (1), 21 (2), 28 (3)—*Ampelopsis Veitchii*, kd. to grd., 2. *Araucaria imbricata*, 2. *Ceanothus azureus*, 2. *Cephalotaxus Fortunei*, 2. *Chamæcyparis sphæroidea*, 3. *Clanthus puniceus*, 1. *Cryptomeria elegans*, 3; *C. japonica*, 3. *Cupressus macrocarpa*, 3; *C. sempervirens*, 3. *Erica*, 2. *Escallonia macrantha*, 2; *E. rubra*, 1. *Fitzroya patagonica*, 3. *Fuchsia Riccartoni*, 1. *Hypericum balearicum*, 2; *H. Calycinum*, 2. *Jasminum nudiflorum*, 3. *Magnolia conspicua*, fl. buds kd., 1; *M. grandiflora*, S. wall, retained foliage, 3 (lost foliage, 1879-80). *Menziesia polifolia*, 3. *Phillyrea angustifolia*, 2. *Piptanthus nepalensis*, 2. *Pittosporum undulatum*, 1. *Podocarpus chinensis*, 2. *Quercus Ilex* and *Q. Suber* lost foliage, 3. *Retinospora ericoides*, 1. *Rhododendrons*, lost fl. buds only, 3. *Roses*, dwfs., China and Noisette, 2; stands., 1; Teas, 2. *Sequoia sempervirens*, 3.

Plants uninjured—Apples, Apricots, Currants, Gooseberries, Peaches, Pears, *Picea* sp., Plums and Strawberries.

1. ELGIN — INVERAVEN, Ballindalloch. — Mr. D. Rose.

Gen. Char. of Soil; Alt., &c. [See p. 166.]

Rainfall, 1880—[Grantown, dist., 10 ms.; ht., 712 ft.; 29·69 ins.].

Date of Onset and Duration of Frost—Very severe frost in Dec. and about the end of Feb.; Jan. not being so severe. In Feb., about the end, we had several nights with 36 degrees of frost [*i.e.*, -4°; too low?].

Plants injured—15 (1), 0 (2), 8 (3)—*Artichoke*, globe, 3. *Borecole*, 1. *Broccoli*, Veitch's, 1. *Brussels sprouts*, 1. *Cabbages*, 1. *Celery*, all sorts, 1. *Clematis Jackmanni*, 3. *Cotoneaster microphylla*, 1. *Cryptomeria japonica*, 3. *Endive*, 1. *Gooseberries*, several, 1. *Jasminum officinale*, 3. *Laurel*, common, 1; Do. Portugal, 1. *Lettuce*, all, 1. *Parsley*, 1. *Penstemons*, 1. *Picea grandis*, 3;

P. Nordmanniana, 3. Rosemary, 1. Sequoia gigantea, 3. Tritoma uvaria, 3. Wallflowers, 1.

2. FORRES, Dunphail.—Mr. D. Myers. [See p. 166.]

Date of Onset and Duration of Frost—Intense frost set in on Oct. 18th, with snow 11 ins.; grd. could not be dug until April 6th.

Min. Temp. and Date.—[Nairn, dist., 9 ms., W.; alt., 84 ft.; Jan. 14th, 18th, 5°]

Plants injured, 1880-81 — 40 (1), 33 (2), 7 (3) — Broccoli, Champion, Early purple Cape, Snow's winter white, Sutton's perfection, Veitch's protecting, Walcheren, all, 1. Catalpa syringæfolia, aurea, 1. Cauliflower, Early Erfurt, Lenormands, Early London, 1. Cistus ladaniferus, 1. Clematis Jackmanni, 2. Coronilla glauca, 1. Cotoneaster microphylla, 3. Cryptomeria japonica, 1. Cupressus Lambertiana, 2; C. sempervirens, 3. Deutzia scabra, 2. Echeveria metallica, 1. Endive, 1. Escallonia Ingrami, 1; E. macrantha, 1; E. rubra, 2. Euonymus europæus, 2; E. radicans, 2. Forsythia viridissima, 1. Fuchsia coccinea, 2; F. macrostemma, 2; F. Riccartoni, 2. Habrothamnus, 1. Laurel, Bay, 1. Laurel, common, 2; Do. Caucasica, 2; Do. Portugal, 2. Lettuce, Daniel's giant white, Daniel's green winter, Hammersmith hardy green, Tennis ball, Wheeler's Tom Thumb, 1. Lilium auratum, 3; L. excelsum, 3. Lonicera japonica, 2. Penstemons, 46 vars., all, 1. Picea grandis, 2; P. Lowiana, 2; P. Nordmanniana, 3; P. Pindrow, 2; P. Pinsapo, 2. Pyrus japonica, 3. Rhododendrons, 2. Roses, stands., all, 1; Teas, 2.

DIVISION XVIII.—(SCOT.) N. W. COUNTIES.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881,
FROM INVERNESS AND ROSS.

INVERNESS. Sum., very dry and hot. Frost set in Sept. 20th; snow on 19th; Winter set in earlier than usual and very severely (Roy Bridge). *Rainfall*, 6.42 ins. below av. of 30 yrs. (Barrahead). Jan. 1881, snow, not very heavy, but frost very severe (Aviemore).

Low temps., without parallel in last 40 yrs. (Culloden). *Min. temps.*, Roy Bridge, alt., 310 ft.; Jan. 15th, $-0^{\circ}5$: Fort George (Kilravock), -3° : Culloden, alt., 104 ft.; Jan. 14th, 4° .

Plants injured, 1880-81—10 (1), 9 (2), 4 (3), total at 1 place.

Ross. Sum., unusually mild (Strathconan). *Rainfall*, March, May, Aug., small; total, 7.19 ins. below av. of 8 yrs. (Ardross Castle). Jan. 1881, frost from 3rd to 26th terribly severe; arm of sea for 6 ms. frozen, 6 or 7 ins. thick (Lochbroom). *Min. temps.*, Achonochie Lodge, alt., 125 ft.; Jan. 18th, -4° ; Ardross Castle, alt., 450 ft.; Jan. 14th, 18th, 4° .

Plants injured, 1880-81 — 37 (1), 22 (2), 51 (3), total at 2 places.

REPORTS.

1. INVERNESS—FORT GEORGE, Kilravock.—Mr. J. Manson.

Rainfall, 1880—[Inverness (Culloden Ho.), dist., 7 ms.; alt., 104 ft.; 23.65 ins.].

Min. Temps. and Dates—[Jan. 14th or 18th ?], -5° : [Nairn, dist., 8 ms., E.; alt., 84 ft.; Jan. 14th, 18th, 5°].

Plants injured, 1880-81—10 (1), 9 (2), 4 (3)—*Araucaria imbricata*, 2. *Arbutus Andrachne*, 1. *Artichoke*, globe, 3. *Azalea indica*, 3. *Broccoli*, 2. *Brussels sprouts*, 1. *Cabbages*, 2. *Cauliflower*, 1. *Celery*, 1. *Clematis Jackmanni*, 3. *Cytisus scoparius*, 1. *Furze*, 1. *Laurel*, Bay, 2. *Laurel*, common, 2; Do. Portugal, 2. *Laurustinus*, 1. *Lavander*, 3. *Lettuce*, 1. *Onions*, winter, 1. *Parsley*, 2. *Roses*, H. P.'s, 2; stands, 1. *Tritoma uvaria*, 2.

Observations—We received no damage in 1879-80; but the winter of 1880-81 has been severer than any previous one which can be remembered.

1. ROSS—ALNESS, Ardross Castle—Mr. R. Massie. [See p. 170.]

Rainfall, 1880—33.34 ins.

Date of Onset and Duration of Frost—Middle of Oct. with slight intermission to the end of March.

Min. Temp. and Date—Jan. 14th and 18th, 4° .

Plants injured 1880-81—18 (1), 5 (2), 33 (3)—*Abies Douglasii*, 3. *Araucaria imb.*, 3. *Artichoke*, globe, 2. *Biota orientalis*, 3.

Borecole, 1. Broccoli, 1. Brussels sprouts, 2. Box, 3. Cabbages, 1. Carnations, 3. Cauliflower, 1. Cotoneaster microphylla, 3; Crataegus Pyr., 3. Cupressus Lambertiana, 2; C. Lawsoniana, 3; C. macrocarpa, 1. Fuchsia Riccartoni, 3. Gladiolus, 1. Laurel, common, 3; Do. Portugal, 2. Libocedrus decurrens, 3. Lilac, 3. Lonicera fragrantissima, 3. Picea cephalonica, 3; P. Nordmanniana, 3. Picea Pinsapo, 3. Pinus sylvestris, 3. Quince, 1. Rhododendrons, 3. Roses, dwfs., 3. H. P.'s., 3. Santolina chamæcyparis, 1. Sequoia gigantea, 3. Strawberries, 3.

Observations—Owing to the unusually dry and bright summer of 1880, Apples, Cherries, Pears and Plums had their young wood well ripened, and consequently sustained little or no injury.

3. KILMUIR, Balmagowan Castle. Mr. J. Urquhart.

Gen. Char. of Soil; Alt., &c. [See p. 171].

Rainfall, 1880—[Cromarty, dist., 7 ms., E.; alt., 28 ? ft.; 22·06 ins.].

Date of Onset and Duration of Frost—Oct. 26th to end of Feb.

Min. Temps. and Dates—Jan. 16th, -6°; 18th, -4°.

Plants injured, 1880-81—19 (1), 17 (2), 18 (3)—Ampelopsis Veitchii, 2. Apricots, 1. Araucaria imbricata, 14 to 15 ft. high, 2. All Cabbage tribe, 1. Carnations, 1. Cedrus Atlantica, 2. Celery, 1. Clematis Jackmanni, 2. Cotoneaster microphylla, 1; C. Simonsii, 2. Deutzia scabra, 3. Endive, 1. Erica, 3. Escallonia Ingrami, 2. Euonymus japonicus, 1. Fuchsia Riccartoni, 3. Gooseberries, 3. Holly 3; Do. varieg., 2. House-leek, 1. Hypericum Calycinum, 3. Ivy, 2. Kale, 1. Laurel, common, 2; Do. Portugal, 1. Lavander, 2. Lonicera fragrantissima, 2. Narcissus, 3. Nectarines, 3. Onions, winter, 2. Parsley, 3. Peaches, 3. Pears, 3. Penstemons, 1. Picea Lowiana, 3; P. Nordmanniana, 3. Pinus excelsa, 3. Plums, 3. Privet, 3. Rhododendrons, 1. Rosemary, 1. Roses, H. P.'s, 2; Teas, 2. Strawberries, 3. Taxodium distichum, 14 or 15 ft. high, 2. Tritoma uvaria, 1. Wallflowers, 1.

DIVISIONS XX.—XXIII.—IRELAND.

METEOROLOGICAL OBSERVATIONS ON THE YEAR 1880 AND JAN. 1881,
FROM MUNSTER, LEINSTER, CONNAUGHT AND ULSTER.

MUNSTER.—The weather of 1880 was on the whole more genial than that of several years past; *Rainfall*, 10·33 ins. below av. of 15 yrs. (Cork). Cold weather, with first frost on Oct. 2nd; much rain, Nov. and Dec., with heavy gales and frosts. Jan. 1881, month very cold and temp. very severe, from 20th to 22nd, ice 3·5 ins., thick (Miltown Malbay, Cy. Clare). *Min. temps.* Killaloe, alt., 115 ft.; Jan. 16th, 17th, 7°: Blackrock, alt., 194 ft.; Jan. 15th, 8°: Waterford, alt., 60 ft.; Jan. 17th, 10°: Cork, alt., 70 ft.; and Ennis, alt., 156 ft.; Jan. 16th, 12°: Valentia, alt., 20 ft.; 20th—26th, 24°.

Plants injured, 1880-81—40 (1), 21 (2), 3 (3), total at 1 place.

LEINSTER. Spring, mildest for years; July, wettest (Dalkey). *Rainfall*, 36·23 ins., greatest since 1852 (38·54 ins.) (Dublin). Jan. 1881, dry to 17th, with very low temp. (Stoneyford, Cy. Kilkenny). Hard frost from 5th to 28th, (Twyford). *Min. temps.*, Carton, alt., 200 ft.; Jan. 16th, 4°: Dublin, alt., 162 ft.; Jan. 25th, 4°: Parsonstown, alt., 186 ft.; Jan. 21st to 23rd, 6°: Gorey, Jan. 17th, 9°·6: St. Mullins, alt., 193 ft.; Jan. 19th, 10°.

Plants injured, 1880-81—33 (1), 47 (2), 26 (3), total at 3 places.

CONNAUGHT. A splendid year throughout, excepting July, very wet, (Ballinasloe, Cy. Galway). Jan. 1881, temp. unusually low (Kilconnell, Cy. Galway). Frost from 5th to 26th, severest for 50 yrs.; below 10° on 7 nights (Enniscoe). *Min. temps.*, Markree Castle, alt., 132 ft.; Jan. 16th, -2°·3: Crossmolina, Enniscoe, Jan. 22nd, 0°: Ballinasloe, alt., 162 ft.; Jan. 16th, 8°: Tuam (Gardenfield), 9°: Galway, alt., 215 ft.; Jan. 17th, 20th, 22nd, 13°: Mullaghmore, alt., 36 ft.; Jan. 15th, 14°.

Plants injured, 1880-81—26 (1), 24 (2), 20 (3), total at 1 place.

ULSTER. *Rainfall*, much below av. (Florence Ct., Cy. Fermanagh). Do., 6·78 ins. below av. of 14 yrs. (Sydenham, Cy. Down). Most favourable yr. for agriculture (Londonderry). Jan. 1881, frost from 5th to 27th (Newtownards, Cy. Down, and Stewartstown, Cy. Tyrone). *Min. temps.*, Warringstown, alt., 191 ft.; Jan. 22nd, -1°:

Colebrooke Pk., alt., 230 ft. ; Jan. 22nd, 0° : Glaslough, alt., 100 ft. ; Jan. 18th, 22nd, 0° : Aghalee, alt., 130 ft. ; Jan. 22nd, 4° : Seaford, Jan. 16th, 4° : Rathmullen, Jan. 25th, 6° : Lissan, alt., 305 ft. ; Jan. 16th, 18th, 26th, 9° : Armagh, alt., 206 ft. ; Jan. 17th, 9°·4 : Newtown Ards., Jan. 17th, 10° : Londonderry, alt., 93 ft. ; Jan. 17th, 11°·8 : Buncrana, alt., 15 ft. ; Jan. 24th, 25th, 13° : Donaghadee, alt., 37 ft. ; Jan. 17th, 14°.

Plants injured, 1880-81 — 55 (1), 58 (2), 36 (3), total at 5 places.

REPORTS.

XX. MUNSTER—1. CLARE—NEWMARKET-ON-FERGUS, Dromoland Castle.—Mr. W. Wilson. [See p. 175.]

Rainfall, 1880—[Ennis, dist., 10 ms. ; alt., 21 ft. ; 36·02 ins.].

Date of Onset and Duration of Frost — Jan. 4th, lasted five weeks.

Min. Temp. and Date—Jan. 9th, 12° : temp. continued for a week from 16° to 12°.

Plants injured, 1880-81—40 (1), 21 (2), 3 (3)—Aloes, 1. Broccoli, Knight's and Snow's, 1. Brugmansia sanguinea, 1. Brussels sprouts, 2. Buddleia globosa, 3. Cabbages, 2. Cauliflower, London, 1. Cercis siliquastrum, 2. Chamærops Fortunei, 1. Coronilla glauca, 1. Cryptomeria elegans, 1 ; C. japonica, 1. Cupressus macrocarpa, 1 ; C. sempervirens, 1. Dahlia variabilis, 1. Deutzia scabra, 2. Echeveria metallica, 1. Endive, 1. Euonymus europæus, 2 ; E. japonicus, 1. Genista racemosa, 1. Gladiolus, 1. Habrothamnus, 1. Hibiscus syriacus, 2. Hyacinths, 1. Juniperus, 2. Lettuce, Drumhead and Tom Thumb, 1. Lilium auratum, 1 ; L. excelsum, 1 ; L. lancifolium, 1. Peaches, Albatross, Albert, Hative, Noblesse, Victoria, Violette, 1. Retinospora jasmin., 1. Roses, many, 1 ; in addition to the following H. P.'s, stands. on Manetti, A. de Diesbach, A. duchesse, B. de Rothschild, B. Gonella, Beauty of Waltham, Bessie Johnstone, Boule d'Or, Ch. Forestier, Ch. Lawson, Ch. Margottin, C. Verdier, Cloth of Gold, Mad. V. Verdier, C. de Paris, Comtesse de Chabrillante, Countess of Oxford, Duke of Wellington, Ed. Morren, Ed. Verdier, Gl. Jacquenimot, Gloire de Dijon, La France, Mad. Duchesse, Mad. H. Jamain, R. Hale.

XXI. LEINSTER—1. DUBLIN, Glasnevin.—Mr. F. W. Moore.

Gen. Char. of Soil; Alt., &c. [See p. 178.]

Rainfall, 1880—[Phoenix Pk., alt., 164 ft.; ht., 1 ft.; 36.23 ins., on 191 days].

Min. Temp. and Date—[Dublin, alt., 162 ft.; Jan. 25th, 4°].

Plants injured, 1880-81—24 (1), 34 (2), 16 (3)—*Abies Morinda*, 3. *Aloysia citriodora*, 1. *Aralia papyrifera*, 1. *Arbutus Andrachne*, 2; *A. procera*, 2; *A. Unedo*, 2. *Artichoke*, globe, 3. *Arundo conspicua*, 2. *Benthamia fragifera*, 2. *Brugmansia sanguinea*, 1. *Buddleia globosa*, 2; *B. Lindleyana*, 2. *Ceanothus americanus*, 1; *C. azureus*, 1; *C. dentatus*, 1; *C. grandiflorus*, 1; *Chamæcyparis sphæroidea*, 3. *Cistus ladaniferus*, 2. *Clianthus puniceus*, 1. *Colletia cruciata*, 2; *C. ferox*, 2. *Colutea arborescens*, 2. *Coronilla glauca*, 2. *Cupressus torulosa*, 1. *Dacrydium cupressinum*, 3. *Daphne indica*, 1. *Dracæna australis*, 1. *Echeveria metallica*, 1. *Elæagnus argentea*, 2. *Embothrium coccineum*, 1. *Eriobotrya japonica*, 1. *Escallonia Ingrami*, 2; *E. montevidensis*, 2; *E. rubra*, 3. *Eucalyptus globulus*, 2; *E. coccifera*, 2. *Eugenia Ugni*, 2. *Euonymus japonicus*, 1. *Eurybia argophylla*, 1. *Furze*, 2. *Garrya elliptica*, 2. *Genista racemosa*, 1. *Gladiolus*, 3. *Grevillea rosmarinifolia*, 3. *Griselinia littoralis*, 3. *Gunnera scabra*, 3. *Habrothamnus*, 1. *Halesia tetraptera*, 3. *Holly*, variegated, 3. *Hypericum balearicum*, 2. *Jasminum officinale*, 2. *Laurel*, Bay, 2. *Laurustinus*, 1. *Lavander*, 1. *Lavatera arborea*, 1. *Liquidambar styraciflua*, 2. *Magnolia grandiflora*, 3; *Do. Exmouth var.*, 3. *Myrtle*, 2. *Nandina domestica*, 1. *Negundo fraxinifolia*, 2. *Paliurus aculeatus*, 2. *Passiflora cœrulea*, 1. *Phormium tenax*, 2. *Photinia glabra*, 2; *P. serrulata*, 2. *Pinus insignis*, 2. *Podocarpus andina*, 2. *Quercus glabra*, 1; *Q. Ilex*, 2; *Q. Suber*, 2. *Raphiolepis ovata*, 3. *Rosemary*, 2. *Ruscus aculeatus*, 3. *Tritoma uvaria*, 2. *Veronica salicifolia*, 2.

Plants uninjured — *Aralia Sieboldii*, *Arundo Donax*, *Azalea amæna*, *A. indica*, *Berberidopsis corallina*, *Berberis* sp., *Bœhmeria nivea*, *Boussingaultia*, *Broussonetia papyrifera*, *Cedrus*, all three sp., *Chamærops Fortunei*, *Choisya ternata*, *Cupressus* sp. (except *C. torulosa*), *Deutzia scabra*, *Escallonia macrantha*, *Euonymus radicans*, *Forsythia* sp., *Fuchsia* sp., *Gleditschia* sp., *Hydrangea* sp., *Laurel*, all, sp., *Leptospermum lanigerum*, *Libocedrus* sp., *Lilium* sp., *Olearia*, *Osmanthus* sp., *Phillyrea* sp., *Picea* sp., *Pinus* sp. (except

P. insignis), *Piptanthus nep.*, *Pittosporum Tob.*, *Podocarpus chinensis*, *Retinospora* all sp., *Rhus* sp., *Ribes*, *Roses* all, *Salisburia*, *Santolina chamæcyparis*, *Sequoia* sp., *Skimmia japonica*, *Veronica Andersoni*, *V. Traversi*, *Weigela*, *Wistaria*, *Yucca* sp.

Observations—A curious result of last winter is the manner in which one out of a group of plants of the same species and growing under apparently similar circumstances was killed, while the others remained uninjured. This was especially the case with *Coniferæ*. The more exposed plants were frequently the least injured.

2. KILDARE—MAYNOOTH, Carton Pk.—Mr. E. Knowldin.

Gen. Char. of Soil; Alt., &c. [See p. 178.]

Rainfall, 1880—26·29 ins.

Date of Onset and Duration of Frost—Jan. 5th, the most severe frost began, lasting without intermission till Feb. 2nd.

Min. Temp. and Date—Jan. 16th, 4°.

Plants injured, 1880-81—5 (1), 9 (2), 5 (3)—*Arbutus Unedo*, 2. Artichoke, globe, kd. to grd., 2, 3. *Aucuba japonica*, variegata, 3. Borecole, 3. Broccoli, Champion late white, Grange's autumn, Mackey's, Snow's winter, all, 1. *Escallonia macrantha*, large plants on wall, 2. *Euonymus radicans*, 2. *Garrya elliptica*, 2. Holly, variegated, 3. *Hypericum Calycinum*, 3. *Laurustinus*, many fine bushes, in sheltered places, 1. Lettuce, hardy Bath Cos (black seeded), nearly all, 1. Onions, winter, 1. Pampas grass, 2. Parsley, 2. *Phormium tenax*, variegatum, 1. Roses, dwfs., on briar, 2; *H. P.*'s (stands) on briar, very few, 1. *Tritoma uvaria*, 3.

Plants uninjured—*Coniferæ*.

3. WEXFORD—GOREY, Knockmullen.—Miss M. Owen.

Gen. Char. of Soil; Alt., &c. [See p. 182.]

Rainfall, 1880—[Gorey, alt., 80 ? ft.; 39·13 ins., on 193 days].

Date of Onset and Duration of Frost—Nov. 18th, 21°·6. Jan. 1st to 27th.

Min. Temp. and Date—Jan. 17th, 9°·6.

Plants injured, 1880-81—4 (1), 4 (2), 5 (3)—*Aloysia citriodora*, 1. *Arbutus Unedo*, 3. *Bambusa Fortunei*, 3. *Berberis Darwinii*, 3. Dahlias, 1. *Dracæna australis*, 2. *Erica tetralix*, *Lawsoniana*, 3. *Fuchsia Riccartoni*, 2. Furze, 3. Lavander, 1. Myrtle, 2. Rosemary, 1. *Ruscus aculeatus*, 3.

Plants uninjured—*Bellis perennis* cœrulea, *Chamærops Fortunei*, *Clematis Colinsoi*, *C. Jackmanni*, *Cocculus japonica*, *Crinum capense*, *Dahlia variabilis pompon* "Crimson Beauty" only survived, *Desfontainea spinosa*, *Deutzia scabra*, *Dionæa muscipula*, *Drosera capensis*, *D. dichotoma*, under bell glass, *Erica carnea*, *Do. alba*, *E. ciliaris*, *E. Mawiana*, *E. vulgaris* pigmæa, *Do. variegata aurea*, *Do. argentea*, *Euonymus radicans*, *Fabiana imbricata*, *Fuchsia minima*, *F. sanguinea*, *Gladiolus Sandersonii*, *Hyacinth*, *Iris cristata*, *I. foetidissima*, fol. var., *Pseudacorus*, fol. var., *I. pumila*, *Lavander* one plant, *Ligustrum lucidum*, *Lilium auratum*, *L. lancifolium*, *Lobelia repens*, *Lonicera japonica*, *Menziesia polifolia*, *Montbretia Potsii*, *Narcissus albidus*, bicolor, *bulbocodium*, *Burbidgei*, *cernuus*, *crystallinus*, *Horsfieldii*, *Humei*, minor (nanus), *odorus*, *do. fl. pl.*, *tortuosus*, &c., *Nertera depressa*, *Penstemons nitidum*, *procerum*, *pubescens*, *Philesia buxifolia*, *Retinospora ericoides*, *R. plumosa aurea*, *Do. argentea*, *Rhododendron anthopogon*, *R. arboreum* and hybrids, *R. Chamæcistus*, *R. ciliatum* (fls. only kd.), *R. ferrugineum*, *R. hirsutum*, *R. lepidotum*, *Ribes sanguinea*, *Roses*, dwfs., *H. P.'s*, *Yellow Banksian*, stands., *Teas &c.*, *Salisburia*, *Santolina chamæcyparis*, *Sarracenia Drummondii*, *Do. alba*, *S. flava*, *S. purpurea*, *Saxifraga Fortunei*, *S. japonica*, *S. sarmentosa*, *Tritoma pumila*, *T. uvaria*, *Veronica nutkeana*, *Vittadenia triloba*.

XXII. CONNAUGHT—SLIGO, Markree Castle.—Mr. J. Macphail.

Gen. Char. of Soil; Alt., &c. [See p. 186.]

Rainfall, 1880—39·68 ins.

Date of Onset and Duration of Frost—Sept. 13th to May 12th; great frost from Dec. 16th to Jan. 26th.

Min. Temp. and Date—Jan. 16th, -6°.*

Plants injured, 1880-81—26 (1), 24 (2), 20 (3)—*Abies Morinda*, 1. Almond, 3. *Aloysia citriodora*, in cold frame, 2. *Araucaria imbricata*, 2. *Arbutus Unedo*, 1. Artichoke, globe, 2. *Arundo conspicua*, 1; *A. Donax*, in cold frame, 2. *Aucuba japonica*, variegata, 2. *Azalea amæna*, 1. *Berberis Darwinii*, protected, 2; *B. japonica*, 3. *Borecole*, 1. Broccoli, Knight's protecting white, Purple sprouting, Snow's winter, Walcheren, all, 1. *Broussonetia papyrifera*, 1. *Brus-*

* Mr. E. Salis gives the temp. as -2°·3 at Markree Castle, Jan. 16th, in *Marriott's Report*, p. 151.

sels sprouts, 1. *Buddleia globosa*, 1. Cabbages, 1. Carnations, 1. Catalpa, 2. *Cedrus Deodara*, 2. *Cephalotaxus Fortunei*, 2. *Chimonanthus fragrans*, 3. *Clematis Jackmanni*, 3. *Coronilla glauca*, 1. *Cotoneaster microphylla*, 3; *C. Simonsii*, 3. *Cryptomeria elegans*, 2. *Cupressus borealis*, 3. *Cytisus scoparius*, fl. pl., 2. *Desfontainea spinosa*, in cold house, 3. Endive, 1. *Erica*, 2. *Escallonia Ingrami*, 1. *Forsythia viridissima*, 3. *Fuchsia Riccartoni*, 2. *Griselinia littoralis*, protected, 3. *Gunnera scabra*, protected, 3. Holly, 2; Do. variegated, 2. *Hydrangea japonica*, 3. *Jasminum nudiflorum*, 1; *J. officinale*, 2. Kale, 1. *Kœlreuteria paniculata*, 3. Laurel, Bay, 1. Laurel, common, 2; Do. Portugal, 3. *Laurustinus*, 1. Lavender, protected, 3. Lettuce, 1. *Leycesteria formosa*, 1. *Menziesia polifolia*, 2. *Olearia Haastii*, protected, 3. Onions, winter, 1. Pampas grass, 1. *Passiflora cœrulea*, 1. Parsley, 2. *Quercus Ilex*, 1. *Retinospora*, 2. Rhododendrons, 3. Rosemary, 1. *Sequoia gigantea*, 3; *S. sempervirens*, 2. *Skimmia japonica*, 1. *Veronica Andersoni*, 2; *V. salicifolia*, 2; and *V. traversi*, all protected, 2. Wallflowers, 3. Yew, 3. *Yucca gloriosa*, 1.

XXIII. ULSTER—1. ANTRIM—1. LARNE, GARRON Tower.—Mr. G. Porteous.

Gen. Char. of Soil; Alt., &c. [See p. 189.]

Min. Temp. and Date—[Jan. 17th and about 10° ?].

Plants injured, 1880-81—*Fuchsia coccinea*, 3; *F. Riccartoni*, 3. *Hydrangea Hortensia*, 3. *Veronica Andersoni*, 2.

Observations—Excepting the preceding we did not suffer from the last winter. Vegetables were uninjured. Of Broccolis, Carter's champion, Cattell's eclipse and Sutton's perfection, we have had splendid heads, and of which not a leaf was injured.

2. ANTRIM, Shane's Castle.—Mr. T. Seaton. [See p. 189.]

Date of Onset and Duration of Frost—Temp. from Jan. 11th to 25th, 14°.

Min. Temps. and Dates—Jan. 15th, 8°; 21st, 25th, 9°.

Plants injured, 1880-81—3 (1), 6 (2), 15 (3)—*Aloysia citrodora*, 3. *Araucaria imbricata*, 3. Artichoke, globe, 3. *Aucuba japonica*, 3. Borecole, 3. Broccoli, 2. Brussels sprouts, 3. Cabbages, 2. Carnations, 1. Cauliflower, 1. *Cedrus Deodara*, 3. Celery, 2. *Clematis Jackmanni*, 2. Endive, 1. *Escallonia macrantha*, 3. *Fuchsia Riccartoni*, 3. *Gladiolus*, 3. Laurel, common, 2; Do. Portugal, 3. Myrtle, 2. Parsley, 3. Rhododendrons, espe-

cially old scarlets, 3. Roses, H. P.'s, 3. *Tritoma uvaria*, 3.

Observations—Vegetables suffered very much, although there was a good fall of snow which would have protected them had it not got so dry that the high winds blew it away and exposed all the plants to the intense frost.

2. ARMAGH—1. ARMAGH, Loughgall.—Mr. J. Brennan.

Gen. Char. of Soil; Alt., &c. [See p. 189.]

Rainfall, 1880—33·29 ins.

Date of Onset and Duration of Frost—More or less from middle of Dec. to middle of Feb. 1881.

Min. Temp. and Date—Jan. 17th, 9°·4.

Plants injured, 1880-81—18 (1), 17 (2), 3 (3)—*Aloysia*, 1. Apples, Golden and Ribston Pippin, young, in low wet ground, 1, 2, (see below). *Arbutus* sp., 2. Artichoke, globe, 3. *Aucuba japonica*, 1; *Do. variegata*, 2. *Berberis Darwinii*, 2. Broccoli, 90 p. c., 1. Cauliflower, all (except in cold frame), 1. Endive, 1. *Euonymus japonicus*, 1. *Fuchsia coccinea*, 2. Furze, fl. pl., 2. Laurel, common, and *Laurustinus*, 1, 2; both suffered least in warm sunny situations. Lettuce, "all the year round," 75 p. c., 1. *Lonicera aureo-reticulata*, 1. *Menziesia polifolia*, 2. Myrtle, 2. Pampas grass, 1. *Passiflora cœrulea*, 1. Penstemons, 1. Roses, H. P.'s, mostly, 1; more, 2, especially in low damp soil; Teas and Noisettes, 1, 2; Climbers, 3. Rue, 2. *Schizostylis coccineus*, 1. Stocks, 1. *Tritoma uvaria*, 3. Wallflowers (see below), 2. *Yucca filamentosa*, 2.

Plants uninjured—*Agapanthus*, unprotected. Apples, Golden and Ribston Pippin, in dry situations, unhurt; an old Apple tree in full bloom in Sept. 1880, has now the finest bloom for 8 yrs. past (May 17, 1881). Apricots. Broccoli, 10 p. c. of Backhouse's late, Drummond's late white, and Sutton's late queen. *Echeveria secunda*, placed with a few leaves over N. Lettuce, hardy green, stood fairly well. *Lobelia cardinalis* with a few leaves over it. Nectarines and Peaches. Wallflowers in poor soil, and especially on tops of walls did well.

2. ARMAGH, Palace.—Mr. T. Sheasby. [See p. 190.]

Rainfall, 1880—[Armagh Obs., alt., 208 ft.; 32·65 ins.].

Min. Temp. and Date—[Armagh, alt., 206 ft.; Jan. 17th, 9°·8].

Plants injured, 1880-81—14 (1), 7 (2), 0 (3)—Artichoke, globe, 2. *Aucuba japonica* variegata, 2. *Berberis Darwinii*, 2. Borecole, 1. Broccoli, Leamington, Model, Snow's winter white, Veitch's self-protecting autumn; Veitch's spring white, and Veitch's Wilcove improved, all, 1. Brussels sprouts, 1. Cabbages, 1. Carnations, 2. Endive, 1. Kale, 1. *Kalmia latifolia*, 2. Laurel, Bay, 1. Laurel, common, 2. *Laurustinus*, 1. Lettuce, Stanstead Park, 1. Onions, winter, 1. Parsley, 1. Quince, 1. *Rhododendron ponticum*, 2. Roses, stands. on briars, 1. Wallflowers, 1.

3. MONAGHAN—MONAGHAN, Glaslough.—Mr. W. Swanborough.

Gen. Char. of Soil; Alt., &c. [See p. 191.]

Rainfall, 1880—About 40 ins.

Date of Onset and Duration of Frost—Jan. 8th till Feb. 1st; with constant fogs, hoar frost and snow.

Min. Temps. and Dates—Jan. 18th and 22nd, 0°.

Plants injured, 1880-81—20 (1), 27 (2), 15 (3)—*Arbutus procera*, 3. *Arundo conspicua*, 1; *A. Donax*, 1. *Aucuba japonica*, 2; *Do. variegata*, 2. *Berberis Darwinii*, 1. Borecole, 1, 2. Broccoli, Cattell's eclipse, Cooling's matchless, Frogmore protecting, Knight's protecting, Model. Penzance white, Snow's winter, Spring white, Veitch's protecting autumn, all, 1. Brussels sprouts, 3. Cabbages, 3. Carnations, 1, 2, 3. Cauliflower, 1. *Ceanothus azureus*, 2; *C. dentatus*, 2. *Cedrus Deodara*, 2. Celery, 2. Endive, 1. *Escallonia macrantha*, 2. *Euonymus japonicus*, 2. *Fuchsia gracilis*, 3; *F. Riccartoni*, 3. *Garrya elliptica*, 2. *Gladiolus*, 1. Holly, 3; *Do. variegated*, 3. Hyacinths, 3. *Hypericum Calycinum*, 2. Kale, 1, 2. Laurel, Bay, 2. Laurel, common, 1, 2. Lavander, 2. Lettuce, 1, 2. *Leycesteria formosa*, 2. Myrtle, 1. *Narcissus*, Bazelman major, Grand monarque, Pearl, Queen Victoria, Soleil d'or, 3. Parsley, 1, 2. *Picea lasiocarpa*, 3; *P. Pinsapo*, 2, 3. *Rhododendrons*, 1, 2, 3 (see below), Roses, dwfs. on own roots, 1, 2, 3; stands. on briars, 1, 2, 3; Teas, 1, 2. *Sequoia sempervirens*, 2. *Veronica Andersoni*, 1. Wallflowers, 1, 2.

Observations—*Rhododendrons* were severely damaged irrespective of kinds; but chiefly of the best class of *Ponticum* (seedling hybs.). Sheltered positions do not seem to have favoured them in the least; for those most injured were either on the close margin

of various Coniferous trees, or as under-shrubs to evergreen and deciduous trees. The foliage is quite black, as if they had been laden with moisture when frozen; for we had not sufficient sun to injure them.



